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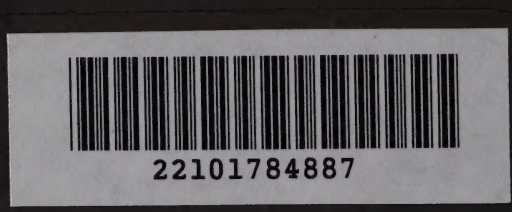
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# THE TONGUE

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# THE TONGUE

## AS AN INDICATION IN DISEASE

BEING THE

## Lumleian Lectures

DELIVERED AT

THE ROYAL COLLEGE OF PHYSICIANS IN MARCH 1888

BY

W. HOWSHIP DICKINSON, M.D., F.R.C.P.

HONORARY FELLOW OF CAIUS COLLEGE, CAMBRIDGE; SENIOR PHYSICIAN TO AND LECTURER ON MEDICINE AT ST GEORGE'S HOSPITAL; CONSULTING PHYSICIAN TO THE HOSPITAL FOR SICK CHILDREN; CORRESPONDING MEMBER OF THE ACADEMY OF MEDICINE OF NEW YORK

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# THE TONGUE

## AS AN INDICATION OF DISEASE.

### INTRODUCTION.

These Lectures are published as delivered, with only a few alterations, chiefly verbal. I had intended to have begun them with a brief notice of what had been written on the subject of which they treat, but was compelled by the pressure of other matters to limit myself to the few necessary references which are to be found in the text. I now prefix such a sketch as I had designed. It does not pretend to exhaust the literature of the subject, but rather to give specimens of the views held at different times. The condition of the tongue has not escaped observation even from the earliest, though the allusions made to it are often fragmentary and incomplete. I have been disappointed to find how many and how great medical observers, whose minds must have been stored with pictures of the tongue,

each with a practical motto attached, have given us none of their experience in this respect.

I have mentioned in the text (p. 90) some remarks of Hippocrates as to dryness of the tongue, and I now introduce further details which have been given by this great observer.

Hippocrates makes frequent mention of the tongue; in this particular, as in most matters of observation, striking is his superiority to the writers of many succeeding centuries. He often refers to the tongue in fever generally as dry or parched, sometimes without other qualification, as in the case of one Nicodemus, who had a febrile attack and a parched tongue after a debauch—an observation which can be warranted by modern instances. In several cases of fever not further defined, in a fatal case of fever, in fever after labour, and in fever with jaundice, dryness of the tongue is mentioned. One Philiscus died with what is exactly described as intermittent hæmaturia; he had intermitting fever, intermitting black urine and lividity of the extremities; he had also a parched tongue. In one species of ardent fever the tongue is stated to be rough, dry and 'saltish,' in another rough, dry and very black. A young woman who had an attack of acute fever, of which she recovered, is represented as having a tongue which was 'sooty' and dry. The blackness of the tongue is of interest taken together with what

we know of the black tongue of typhus. In a case of quinsy the tongue is described as red and parched. Again, in connection with quinsy, the tongue is described as having characters which we cannot but recognise as those of glossitis, dry, swollen, livid, hard, inflexible and likely to produce suffocation—a danger to be averted by bleeding from the sublingual veins.

Aretæus speaks of dryness of the tongue in connection with pneumonia, ardent fever, and epilepsy, and of the mouth as parched in diabetes on abstinence from drink.

Paulus Ægineta, whose date has been variously assigned between the fourth and seventh centuries, refers to the tongue, sometimes on his own authority, sometimes on that of others. He mentions it as parched in the plague, and rough with ardent fever and phrenitis. For dryness and roughness of the tongue, with which he is evidently very familiar, he recommends the local application among other things of oil of roses and honey, and advises that the patient should lie on his side rather than on his back, and should keep his mouth shut, because 'keeping it open allows the moisture to dry up.' Paulus has here anticipated some later writers, though, unlike them, he has not inferred too much from his observation. He describes inflammation of the liver in a manner which clearly indicates abscess, and says that the tongue with this is at first red, and afterwards black.

Rhases, in the tenth century, describes the blackness of the tongue which occurs with plague, a concomitant of the disease which has since been often noticed. Dryness and blackness of the tongue, together with unquenchable thirst, were witnessed by Dr. Hodges in the Plague of London, as recorded in his 'Loimologia.'

Avicenna, in the eleventh century, speaks like Paulus of roughness and dryness of the tongue as calling for local treatment, Indian salt, oil of roses, quince-seed, etc., and advises that those affected should not gape or sleep supine, for both these things dry the tongue. 'A tongue covered with blackness is not to be permitted, but is to be scraped and dealt with as already described, for otherwise noxious vapours will arise from it and cause inflammation of the brain.' If for 'inflammation of the brain' we read delirium, we see here an instance of what is not uncommon—a sound observation connected with a theory which is not so. The concurrence of a black tongue with delirium is probably an experience as widely spread as typhus.

On the whole, the allusions to the tongue in disease are fewer and slighter than would be expected, considering the variety it presents; for we can scarcely suppose that the ancient physicians were so unlike their successors as not habitually to look at it as an act due to the patient, or that they could

fail to gather from it much more than has found expression.

Coming to later ages, I have referred (p. 90) to the theoretical view of Willis, that the glutinous secretion about the mouth in certain conditions was due to inspissation of the nervous juice, and its discharge into the mouth by the salivary channels.

Sydenham seldom refers to the tongue, and never, so far as I can find, excepting simply to describe its aspect apart from theoretical considerations. He describes the tongue in the natural course of continued fever as neither dry nor very different from its usual colour except in being rather whiter. If, however, the patient became heated beyond the usual amount of fever, the tongue then became dry and yellowish-brown.

Boerhaave, who wrote in the early part of the eighteenth century, and whose works amount to an encyclopædia of medicine and the allied sciences, makes occasional mention of the tongue, but less often than might have been expected. He dwells, like so many other writers, on the tongue in ardent fevers, describing it as 'yellow, black, burnt and rough,' a condition attended with unquenchable thirst. Much the same conditions, inextinguishable thirst, with a tongue which is dry, foul, white, yellow, brown or black, more especially if there be a scurf or crust on it, and on the mouth and nostrils, are

enumerated among the signs of malignity in acute diseases. Phrensy, he tells us elsewhere, may be foretold by blackness of the tongue. Boerhaave refers, as his topics suggest, and with more soundness of observation than I have found in any preceding writer, to the relation of the salivary secretion to disease and to dryness of the tongue. 'The saliva,' he says, 'continually flows into the mouth of a person in health, and nothing is a surer sign to a physician of disease in a patient than his having a dry mouth.' Elsewhere he tells us that an inflammatory obstruction is indicated, and phlebotomy called for, by suppression of the sweat and spittle. But the mouth he says is made dry also by exposure to air, as in sleeping with the mouth open, and when the nose is stopped up.

Mason Good in his 'Study of Medicine' presents, with much learning and amplitude, the state of medical knowledge in the year 1822. He describes the tongue of scarlatina as red with elongated papillæ, and in the more severe forms as covered with a black chappy crust. In typhus the tongue is first whitish, then dry, livid and black, while the teeth are covered with black tenacious sordes. With yellow fever the tongue is at first white tinged with yellow, then black. Thrush is described as belonging to hectic: the aphthæ in dysenteric fever in particular foreshowing imminent death. With regard to the relation of thirst to dryness of the tongue, which

have been so often associated by the older writers, Mason Good points out that there is sometimes but little thirst though the tongue may be dry and encrusted to the roots, while thirst may be vehement when the tongue and fauces have no dryness whatever. But he does not ignore the existence of thirst together with dryness of the tongue, for elsewhere he connects great thirst, a parched tongue, and an acrimonious condition of stomach.

Armstrong describes the tongue of typhus as besmeared with an adhesive secretion like melted glue, the organ on the evaporation of the thinner parts of the secretion becoming dry and varnished, later brown and then black, from the deposition, as he thinks, of carbonaceous matter.

Among later, but still bygone writers, the tongue finds mention more frequently than can be specified, with a general tendency to regard it, for diagnostic purposes, as little else than an exposed sample of the alimentary canal. There has been a lack of endeavour to look at its manifestations otherwise than empirically, or to analyse its changes and educe laws from them.

Dr. Marshall Hall, in the year 1835, in the 'Cyclopædia of Practical Medicine,' treated of the tongue in relation to symptomatology. He gives without explanation the empirical knowledge or beliefs of his time, associating the white and loaded tongue with

acute *synochus*; the dry brown or black tongue, the mouth being also dry, with typhus; a loaded tongue, of which the load peels off, leaving a red smooth surface, with acute dyspepsia; a furred dry tongue, with local irritation, or inflammation. He adds, with apparent originality, that a relation is to be discerned between the tongue and the secretions of the mouth and the state of the skin, a loaded tongue in particular going with a swarthy complexion and an oily condition of the skin, and a clean or smooth tongue with a natural state of the general surface.

Piorry, in the year 1837, endeavoured to supersede the existing views by a system which largely consisted in the exaggeration of the drying action of the air upon the tongue. This, as has been seen, had by no means escaped the notice of his predecessors in ancient and modern times, though they have not carried their inferences beyond the bounds of discretion. Dryness of the tongue is due, in his view, to the abnormal passage of air over its upper surface connected with openness of the mouth, due to obstruction of the nostrils, enlargement of the tonsils, or many conditions of dyspnœa. He instanced localised dryness of the mouth as the result of the admission of air in the interval left by a tooth, and concluded that the coating of the tongue was chiefly the residuum left on the evaporation of the saliva. The old views empirically associating various phases of coating with

derangements of the stomach and liver, blackness with adynamia, an ill-smelling coat with putridity of the humours, and so on, are to be replaced by a simple scheme in which the drying influence of air and the cleaning influence of food are principally concerned. To chew dry bread, says Piorry, is often a better way to clean the tongue than to swallow emetics and purgatives. The coat is simply dried saliva, which has been allowed to accumulate, and has no special significance. These views, in which truth and error are mingled, but of which the outcome is to ignore or attach little importance to the tongue as a symptom, have apparently suggested much of the scepticism of modern times, in which both truth and error may be discovered.

Dr. Billing, in his well-known work on the 'Principles of Medicine' (4th edit. 1841), reflects the belief of his time in supposing that the condition of the tongue reflects that of the alimentary canal. The tongue, says Dr. Billing, 'affords evidence of the state of the mucous membrane of the stomach and bowels, with which it is continuous.' He speaks of the tongue as naturally white before food, red after, and attributes the difference to the participation of the tongue in the condition of the stomach as regards its blood-supply, the tongue being pale from anæmia when the stomach is anæmic, red from congestion when the stomach is congested. In febrile diseases,

such as early pleurisy, the tongue is pale from anorexia. The tongue pale from this cause does not call for purgatives. The tongue is red when the membrane of the *primæ viæ* is congested, as with dysentery, tuberculous ulceration, and typhoid. Dryness of the tongue, which Dr. Billing notes in connection with advanced febrile states, is due, in his view, to evaporation.

I must give a word to an excellent article on the tongue by the late Dr. Hyde Salter, in the 'Cyclopædia of Anatomy and Physiology,' 1847–1852. This is chiefly anatomical, but has an interest for the present purpose in the correct description which is given of the *fur* or *coat*, for Dr. Salter uses the term *fur* in this sense. 'The *white fur*,' says he, 'consists of a white, opaque, soft, sodden epithelium, which, when viewed under the microscope, differs from the epithelium in its ordinary state, in no other particular than its opacity.'

Dr. C. J. B. Williams, in his well-known 'Principles and Practice of Medicine' (3rd edit. 1856), describes the tongue as influenced by causes which act through the system, and so made red, furred, brown, dry, etc. More wise in his generation than some who have preceded him and some who have followed, he says that 'the connection between febrile and other diseases, and the appearances which they produce on the tongue, is not well understood; but the appear-

ances probably depend on changes induced in the secretion of the mucous membrane and adjoining parts.'

Copland ('Dictionary,' vol iii. Part II., 1858) expresses the opinion of his time in a laborious article, which contains the accumulated results of experience, in which he connects various states of the tongue with various disorders and conditions of system, but makes very little attempt to show why such associations exist, or by what means the several lingual changes are produced. He dwells upon the unfavourable import of dryness, and the contrary indication of a return of moisture. He acknowledges that breathing through the mouth may make the tongue dry, but only in the presence of febrile disease; and he refers to the diminution of saliva which disease of this kind engenders. He describes the *white*, *clammy*, and *loaded* tongues in a manner which conveys much truth but little instruction, since he associates them, with little endeavour to distinguish or explain, with most of the lesser disorders to which flesh is heir, including the less severe catarrhal, inflammatory, and febrile diseases, functional disorder of the digestive and respiratory organs, bilious derangements, visceral diseases, and smoking and drinking. With the *furred* tongue he is more explicit; he defines this much as I have done, describes the changes in it as due to elongation of the filiform

papillæ, and the covering of them with mucus which dries, and connects the condition with severe inflammatory and febrile diseases, and with disease of the brain. He speaks of the exposure of a raw or smooth surface upon the removal of the *fur* as a bad sign, and of its becoming black and hard as a fatal one.

In the year 1863, Mr. Hilton, in his well-known lectures on Rest and Pain, gave evidence of, as he thought, a more immediate connection between nervous irritation and coating of the tongue than had hitherto been adduced. He pointed to unilateral coating of the tongue in connection with decayed teeth on the affected side, and attributed this to reflex nervous influence through the fifth nerve, and produced cases also in which the tongue had become unilaterally coated in connection with disease or injury involving the Gasserian ganglion or one of the branches of the fifth, in both of which circumstances he considered that the change in the tongue was due to nervous irritation. He adduced also the occurrence of greyness of the hair on the side of a decayed tooth, and on that of neuralgia, in evidence of local nervous action upon nutrition. It will be presently seen that by whatever means the greyness may be produced in such circumstances, there are those who maintain, and apparently with reason, that the increased covering on the tongue is in most cases the

result of the restriction of mastication and of friction on the tender side. I shall presently relate a case which suggests that injury to one chorda tympani may produce one-sided coating by interfering with the secretion of saliva on that side.

Dr. Martyn Paine, in his 'Institutes of Medicine' published in New York (8th edit. 1867), generally connects the state of the tongue with that of the alimentary canal, and dwells in particular on redness of it as indicative of inflammation in this position. He considers that the changes displayed by this organ in abdominal disease depend on reflex nervous action.

Mr. Butlin, in the year 1879, attacked the belief then general that the 'fur' of the tongue is chiefly epithelial, and endeavoured to show that it consists mainly of vegetable organisms. Mr. Butlin uses the term 'fur' in the general sense of coat or covering, and maintains that it is composed in health and in disease chiefly of minute living organisms (*schisto-mycetes*) and not of 'cast-off epithelium.' He supported this thesis by numerous examinations, mostly of scrapings from the surface of the tongue, and shows that while these display epithelial cells, the micrococcus forms their greater bulk. I shall show hereafter that examination of the tongue in section has given to me different results. Mr. Butlin has examined the organisms obtained, as I have said,

with a care I believe not before given to them, and concludes that these are the chief constituents of the 'fur' or coat, and not 'cast-off epithelium,' as before held. In this view the organisms accumulate, and the coat forms, chiefly from the absence of mastication; they flourish in moisture and upon liquid food; they cease to grow, and finally come off, with dryness. Mr. Butlin points out that the organisms he has described so minutely have no special relation to individual diseases, but grow in obedience to conditions which are common to many. Of whatever the fur or coat may consist, I think there is truth in much which Mr. Butlin has adduced, but that he has not presented the whole truth will appear from what will follow. It is true that the white coat does not mainly consist of *cast-off* epithelium; but nevertheless it is essentially epithelial, its bulk being composed of epithelium which is still in connection with the papillæ and which has undergone the horny transformation. No doubt organisms are found upon this in varying quantities, but they do not form the major bulk of the white coat. On the other hand, it will be presently shown that such organisms are presented with great abundance in the dry, thick, usually brown, covering of the encrusted tongue, of which it would be no exaggeration to say that they form a very important part. (*See* woodcut, page 60.)

To Dr. Frederick Roberts we owe an excellent

article on the tongue, which appears in Quain's Dictionary, 1882. Dr. Roberts describes the 'fur,' which term he uses, like Mr. Butlin, in the general sense of 'coat,' as consisting chiefly of epithelium, with the addition of the remains of food, bacilli and micrococci. He considers that the increased production of epithelium which causes the 'fur,' is due to hyperæmia dependent either on the general condition of the patient or upon direct or reflex irritation; on the other hand, there are serious conditions, one of which, as we are subsequently told, is long-continued pyrexia, in which the development of epithelium is prevented, so that the tongue becomes red or raw. Dr. Roberts attributes much direct influence to the nervous system in the furring of the tongue, and points to the thickly-coated tongue of apoplexy, to the unilateral furring of neuralgia, and to the furred tongue of migraine.

Finally, Dr. Roberts collects the empirical knowledge which associates certain diseases and conditions with certain states of tongue. In typhoid he tells us the papillæ are enlarged, and there is a whitish or yellowish 'fur,' or possibly the tongue is red, smooth, and glazed, and refers to the belief that if this is tremulous the bowels are deeply ulcerated. With acute rheumatism there is a thick creamy 'fur'; much the same in attacks of gout, in which the tongue is apt to be also brownish. With acute

dyspepsia, catarrh of the alimentary canal, and hepatic disorders, the tongue speedily becomes furred ; with chronic dyspepsia it is thinly coated or clean and raw-looking; with habitual constipation it is large and furred ; in acute gastritis it is red, with a tendency to dryness ; in chronic dysentery, red, glazed and fissured.

Mr. Jonathan Hutchinson,[1] from whom no one can differ without apprehension, accepts Mr. Butlin's description of the 'fur' as chiefly parasitic, and considers it to be chiefly the result of rest, or want of friction. 'In order that *fur* should be present,' says Mr. Jonathan Hutchinson, 'two conditions are necessary. First, that the tongue, or at any rate the furred part of it, should be well clothed with long, well-branched, filiform papillæ ; and secondly, that these papillæ should have been left at rest and allowed to collect upon their tips the well-known white and somewhat slimy substance, which, in a more restricted use of the word, constitutes *fur*. Until recently it was generally taught and believed that this slime consisted of sodden epithelial scales. The accurate microscopic investigations of Mr. Butlin have taught us that this explanation is only in part true, and that the chief constituent is of fungus origin,' the fungoid elements being present whenever the white 'fur'

[1] A course of lectures on diseases of the tongue, delivered at the College of Surgeons, *Medical Press and Circular*, July 1883, pages 1 and 17.

is, whether in disease or health, and of no pathological significance. 'The conditions,' continues Mr. Hutchinson, 'which favour the development of fur on the tongue are briefly those of rest. If we can fully realise this fact, it will help us to the explanation, in a very simple manner, of most of the morbid conditions of the tongue met with in acute diseases. When the tongue is quiet, the papillæ grow freely, their hairs accumulate epithelium, and in the epithelium colonies of micrococci flourish. Large allowance must be made for individual peculiarity, for it is only in those in whom the filiform papillæ are abundant and large, that any development of fur can possibly take place. It is well known that most persons have more or less coated tongues before breakfast, and that the taking of a meal rubs off the fur and cleans the tongue.' Mr. Hutchinson then points out that the tongue cleans first where most exposed to friction, and explains the unilateral coating sometimes observed with tender teeth as the consequence, not of reflex irritation, as had been thought, but of the absence of free mastication. Mr. Hutchinson, in conclusion, offers the following suggestions.

'We must avoid assuming hastily that the condition' (of tongue) 'present has any connection with the disorder for which the patient consults us. Many patients have habitually a profuse growth of filiform papillæ, and great tendency to the accumulation of

fur. In others the papillæ are curiously absent, and the tongue may look bald or rough. In others the furrows may be well marked, and the peculiar fern-leaf pattern present, and yet these several conditions may imply nothing whatever as regards the patient's health.

'In cases in which we have satisfied ourselves that the conditions shown are neither personal peculiarities nor yet the consequences of previous disease, we ought next to inquire carefully whether any local conditions are present in the mouth which will explain them, and by no means jump to the conclusion that they denote disorder of the stomach or liver. If the tongue is dry we inquire whether the nostrils are stopped, and if it is sore we must examine the teeth, and ascertain whether from sharp broken points, from stopping with amalgam, or accumulation of tartar, any possible source of irritation exists.

'If we have failed to discover in the mouth any cause for disease on the surface of the tongue, we must still hesitate as to suspicion of visceral or blood disorder, and ask whether it be not possible that some irritant may have been introduced in the way of food. There are many fallacies in this direction.

'Lastly, if we feel able to confidently exclude all local causes, and obliged to believe that the state of the tongue is in direct connection with the state of the bodily health, we have still before us the difficult

task of deciding as to what the nature of the bond of connection may be.

'The state in question may still possibly be in no way symptomatic of another disorder and not in any degree consequent on it, but rather part of the general disease.

'Above all, we must be on our guard against believing that the state of the tongue is a trustworthy criterion as to that of the mucous membrane of the stomach, and remember that for the most part a furred tongue implies that no food has been eaten, and little more, whilst glossitis and gastritis are conditions which are naturally independent and but seldom co-exist.'

If I were to criticise these remarks from my own point of view, I should say that they were incomplete rather than inaccurate. I do not accept with Mr. Hutchinson the parasitic idea of the white coat, but there is much which presents itself to me as of truth and value in his clinical remarks. But the story is left half-told; the negative part is copiously and accurately stated, the tongue is justly disconnected from the stomach and liver, but the connections which it has, or seems to me to have, with certain constitutional states are not recognised. There is no reference to over-growth of epithelium as distinguished from its undue retention, or to the important condition of dryness from salivary failure.

Mr. Hutchinson, as a surgeon, regards the tongue with reference rather to local than constitutional influences. If I have examined it as a physician, with an eye to general states, I trust I have not ignored or minimised the local modes of action upon which Mr. Hutchinson has so impressively dwelt.

I think it will be apparent that some of the earlier opinions which I have collected, empirical though they be, those especially which associate dryness of the tongue with constitutional disturbance, and attach importance to the coating of it or to its denudation, generally without any attempt to explain either, are more consistent with the truth of nature than much of modern scepticism, of which the purport has been to explain and explain away.

## LECTURE I.

Mr. President and Gentlemen,—What has been written with regard to the tongue is fragmentary and discordant. Among many conflicting opinions the anxious inquirer hesitates as to which he should be guided by. Should he begin with the earlier writers he may find that the further he carries his studies into modern times the further he leaves behind him any glimmering of light with which he started. If he enters first upon the most recent, as being desirous to come quickly to the cream of the matter without troubling himself with what is below the surface, he may hastily conclude that the tongue is a blank upon which further research will be wasted. But there is knowledge which is not of books. Many a practical physician is able to read in the tongue rules of diagnosis, treatment, and prognosis, though he knows not how he acquired the power. It has come to him as part of the tradition of the elders, an accumulation of experience which there have been few attempts, and those not very successful, to analyse or reduce to law. The labour which has been bestowed upon the pulse in recent times is in remarkable contrast with the neglect which has been the lot of the tongue. And this has long been so. The ancient arms of our College display a hand feeling a pulse; they would give to view the duty of the physician less incompletely did they also present a tongue for inspection. The College of Heralds must determine whether it should be gules or argent, or in the language of heraldry as of medicine,

should bear a fur. 'Various and full of meaning,' says a great writer,[1] one whose words must ever be received with reverence within these walls, 'are the conditions and appearances presented by the tongue. A patient would think you careless or ignorant of your craft if you did not at each visit look at his tongue as well as feel his pulse.' But of late the tendency in this matter has been to agnosticism: it has become the habit with many, and those not the least influential, to look upon the changes which this organ displays as of less and less importance, to regard them as accidental rather than essential, as the results of unimportant local conditions rather than as inseparably connected with constitutional disturbances. 'The tongue,' said a great surgeon in my hearing, 'belongs to the mouth in the first place, and to the general system only in the second.' I should have put the general system first; but I will not anticipate my conclusions.

I am about to examine the subject with a fresh appeal to nature, and, putting aside for the present both ancient faith and modern scepticism, shall be content simply to collect the evidence of the wards and the dead-house, and let the tongue speak for itself. This is simple in theory, but in practice complicated, as will become sufficiently apparent, and on this ground I ask not only the indulgence but the patience of those who honour me by attending. It is not my purpose to deal with ailments local to the organ, but only with those changes which have their origin outside it, or belong to the system at large. I look at the tongue as a physician, not as a surgeon, and regard it as symptomatic of disease rather than as the seat of it. My first endeavour has been to make a trustworthy and usable classification. Many terms have been hitherto applied vaguely and in confusion; tongues have been described as *furred*, *coated*, or *dirty*

[1] Sir Thomas Watson.

almost indiscriminately, while there has been too often a failure to attach due importance to such signs as dryness and nakedness. To secure a working classification I prepared hardened microscopic sections of a number of tongues of many kinds (the tongues amounted to 109), and made with the help of the camera lucida the outlines which are now before the College. I was thus enabled to associate the minute and intimate changes with the appearances presented during life to the naked eye. Taking together both naked-eye and microscopic appearances, I arranged the series into what, if I may borrow from the botanists, I may call *natural orders*, using as guides chiefly such characters as appeared on minute examination to be important, and which at the same time were distinguishable with the naked eye during life. It is sufficiently evident that no subdivision excepting one connected with characters evident to common sight could have any practical utility. Thus the classification, though made with the help of the microscope, can be applied without it. It might have been more accurate in some respects, more satisfying to the votary of pure science, could it have been based only on minute anatomy; for there are some changes, especially one —increase of the deep epithelium—which are not easy to be recognised without the use of microscopic sections. I may say more of this hereafter; putting it aside for the present, I have made a classification which I think will work in practice, in which the minute and essential particulars are conveniently bound up with obvious external characters. The amount and distribution of the superficial or horny epithelium is important, since this essentially constitutes the white covering which is so noticeable during life. Other characteristics are: the elongation of the papillæ; the presence of incrustation, by which the proper surface of the organ is concealed; loss or attenuation of the epithelial layers, by which the surface becomes red, bare, or raw; and the quality

of dryness: this last is of great importance, and it may be added that it is recognisable with the naked eye only.

The classification may be thus sketched. First comes the condition of health; rather a variable standard—an average state, rather than an absolute one. Next come the stages of addition; then those of subtraction. In the stages of addition, the epithelium increases more and more, and finally acquires a superstructure, largely composed of foreign material. This is the maximum of clothing; it is succeeded by a process of divesture, under which the tongue may become not only naked but flayed.

In detail, the first stage is where the papillæ are separately capped each with a minute white patch, which consists mainly of horny epithelium; this tongue I call *stippled* or *dotted*. As the covering increases, the spots coalesce, cease to be discrete, and become confluent, or at least appear so to the naked eye. To this degree the term *coated* is applied, as indicating continuity. The increased growths on the papillæ form the larger proportion of the surface; the intervals are more or less filled up by the deeper variety of epithelium and adventitious matters. The coat attains its highest development in what may be conveniently designated as the *plastered tongue*, of which the covering is thick, uniform and conspicuous, and often looks as if laid on with a trowel. The term *furred* is restricted to another acquirement—elongation of the papillæ, which remain separate from each other, at least at their extremities, so as to give a shaggy look, or one suggestive of coarse hair or fur. The last stage of increase, one which may succeed upon the furred tongue, or ensue without its intervention upon the coated or plastered, is where the papillæ are concealed by an incrustation, usually dark and dry, by which the surface is overlaid. From this, as the climax of addition, the scale descends through processes of subtraction. The accumula-

tion comes off to expose either a normal surface or one which is imperfect: the former generally when the crust shelves off gradually, the latter when it breaks away abruptly. Irrespective of the formation and removal of crust, there are other modes of waste and defective growth by which the surface of the tongue is swept clean, and its coverings attenuated or even abolished in parts, so that these become absolutely skinless. We now have the several forms of the red, denuded, and raw tongue, and with these the scale finishes.

Before dealing with these classes individually, I will say a word about the plan I propose to follow. I shall first describe each variety of tongue, and then mention the clinical conditions which have been found with it. With this in view, I have made a habit of arranging cases which have come before me in a tabular form, according to the state of the tongue, annexing at the same time other details. As I must content myself with producing only abstracts of these tables I may say that the particulars systematically noted were: the disease and its duration; the general state as to strength, prostration, and consciousness; the temperature of the body; the arrangements as to food and drink; observations relating to the bowels and stomach, to the nervous system, to respiration with regard to the mouth and nose; the presence of morbid discharges by diarrhœa, diuresis, or suppuration; the amount of the saliva, and the moisture or dryness of the mouth. My performance in this matter has fallen short of my intention. I had hoped to have made a complete compendium of hospital practice; but many cases, chiefly the less important, have escaped notice, so that my tables include only 366 cases; these must be taken as a sample of hospital experience rather than as hospital experience in bulk. They do not fairly show the relative frequency of each kind of tongue, for the more

CLASSIFICATION OF TONGUES.

| TO THE NAKED EYE | MICROSCOPICALLY |
|---|---|
| 1. **Healthy Moist** | White epithelium in small amount on papillæ, not continuous or superabundant |
| 2. **Stippled, Moist** Dotted with white | Excess of white epithelium on papillæ, not extending between them |
| 2 (D).[1] **Stippled, Dry** | Ditto |
| 3. **Stippled + Coated; Moist** Coat continuous in parts | White epithelium on papillæ in excess, with partial filling of intervals |
| 3 (D). **Stippled + Coated, Dry** | Ditto |
| 4. **Coated White, Moist** Coat continuous | Excess of white epithelium on papillæ. Intervals more or less filled up with epithelium and accidental matters |
| 4 (D). **Coated White, Dry** Coat continuous | Ditto |
| 5. **Strawberry** Coated + injected, especially showing in fungiform papillæ | Like the coated or plastered, but with more injection |
| 6. **White, Plastered** Thick uniform coat, abrupt and striking | More elongation of papillæ than with coated tongue, more filling of intervals with superficial accumulation |
| 7. **Furred or Shaggy, Moist** Greatly elongated papillæ | Extravagantly long papillæ, mostly of horny epithelium |
| 7 (D). **Furred or Shaggy, Dry** | Ditto |
| 8. **Encrusted, Dry, Brown** Thick felted dry coat over papillæ | Continuous crust on and between papillæ largely of parasitic matters |
| 9. **Furred or Encrusted becoming bare** Generally dry | Crust breaking away, together with more or less of normal surface |
| 10. **Denuded, Red** Absence of normal covering | General absence of all epithelium excepting the Malpighian layer, sometimes of that also |
| 11. **Red, Smooth, Dry, Membranous Covering** | Level membrane replacing epithelial processes |
| 12. **Cyanosed** | Injected; hypernucleated; excess of deep epithelium |

This classification is illustrated by the plates which are annexed; the figures attached to each drawing correspond with those in the table.

[1] The letter D is used to imply dryness. Thus, to Class 2 a certain description is attached. Class 2 D presents the same characters with the addition of dryness.

# PLATES.

## DESCRIPTION OF PLATE I.

*Class* 1.—Healthy tongue. The epithelial covering is fairly abundant, but not excessively so; the papillæ protrude, but at no great length, and show a little horny epithelium upon their tips, on which are collections of micrococci, to be recognised as dark blue spots. The Malpighian layer, distinguished as a dark blue line abruptly separated from the corium, is of normal thickness. The corium is nucleated but not excessively.

The section which is tinted with logwood was taken from the tongue of a girl nineteen years old, who died in a state of collapse shortly after an extensive burn.

*Class* 2.—Stippled tongue. This during life presented the isolated white points of coating which mark the condition to which the term stippled or dotted is applied. The section shows elongation of the papillæ, with an excess upon each of the horny untinted epithelium which presents itself to the naked eye as the white coat. The intervals are not filled up or coated over, so that the coat is discontinuous.

The section is tinted with logwood. It was taken from the tongue of a child who died of lobar pneumonia.

*Class* 3.—Stippled + coated. Since this presents a mixture of the characters of Classes 2 and 4, it has not been judged to require a separate illustration.

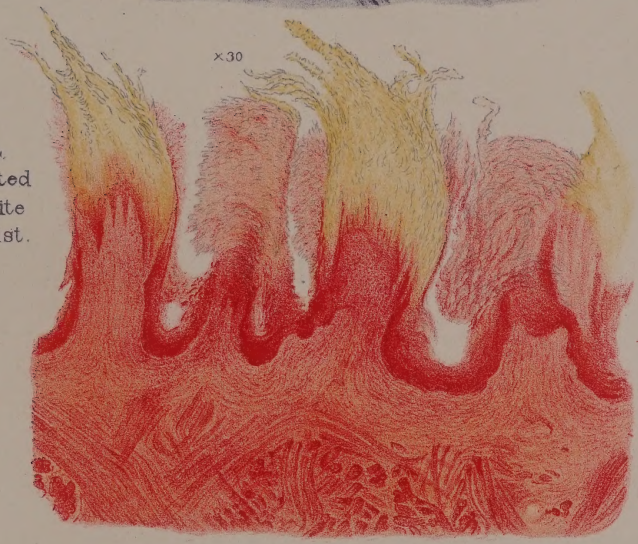
*Class* 4.—Coated white, moist. The white coating during life, and to the naked eye, was continuous, so as to warrant the term coated instead of stippled or dotted. The section shows a great excess of horny epithelium on the papillæ, while the intervals are more or less filled, chiefly with epithelium of the deeper variety, so as to give the aspect of an uninterrupted covering. The corium is not over-nucleated or materially altered.

The section which is tinted with carmine was taken from a case of granular kidney.

*Class* 5.—The strawberry tongue is not shown separately, as its microscope characters are nearly those of Classes 4 and 6.

# Plate I.

1.
Healthy.




4.
Coated
White
Moist.

2.
Stippled
Moist.

Geo West, del.

Geo West & Sons, Chromo.

## DESCRIPTION OF PLATE II.

*Class* 6.—The plastered tongue. During life the tongue from which this section was taken presented the uniform abruptly-marked white covering like something laid on with a trowel. The section shows more elongation of the papillæ than in the preceding classes, while their summits are now somewhat covered, presenting an approach to the encrusted tongue to be shortly displayed. The papillæ are tipped with horny epithelium, much of which, together with extraneous and parasitic matters, overlies them and helps to form the thick white coat which is suggestive of plaster. The corium is not materially altered.

The section which is coloured with carmine was taken on the eleventh day of pleuro-pneumonia.

*Class* 7D.—Furred and dry. The tongue presented to the naked eye a long shaggy growth which covered its back part like long, very coarse hair. The characteristic of the section is the great elongation of the papillæ, chiefly by horny epithelium. The summits are not overlaid as in the encrusted tongue, which otherwise they resemble, but project as loose ends. There is considerable hypernucleation of the Malpighian layer and deeper epithelium and some of the corium.

The preparation was taken from the tongue of a man, under the care of my colleague Mr. Haward, who died of sarcoma of the tonsil and larynx, and had long refused food. The section is coloured with carmine.

## Plate II.

×30

Geo West, del

Geo West & Sons, Chromo.

6. Plastered.

7.D. Furred. Dry.

## DESCRIPTION OF PLATE III.

*Class* 8.—Encrusted, dry. To the naked eye covered with a dry brittle, generally brown, crust which conceals the papillæ. This variety is often presented in combination with the preceding, as in some parts the elongated papillæ may have acquired or kept the accumulation, in other parts not.

The section shows great elongation of the papillæ, though these are obscured by the filling of their intervals largely with epithelium, while a confused mass, which higher powers declare to be partly parasitic (see woodcuts, pages 60 and 61), overlies all.

The section which is coloured with carmine was taken from a case of advanced phthisis with diarrhœa.

*Class* 9 shows one of the modes by which the tongue becomes denuded; rendered red and raw or partially so. This is by an inflammatory or congestive process connected with scarlatina. The corium is much injected and densely infiltrated with leucocytes. As a result of this process the epithelial covering has been extensively destroyed or dislodged; not entirely, however, for traces of it are to be seen in the portion displayed, while in other parts of the section more of the superficial investment was left.

The section which is tinted with carmine was taken from a tongue for which I have to thank Mr. Sweeting, of the Western Fever Hospital. The subject was a child four years old, who died in the third week of scarlatina anginosa together with sloughing of the palate and nephritis.

*Class* 10.—Denuded, red and dry. This tongue to the naked eye was red, smooth, bare and cracked; much what is called the raw-beef tongue. The section shows in parts remains of the deep epithelial structure which elsewhere has been detached, a line of fracture shows at the junction of the bare and the partly covered parts between the Malpighian layer and the corium. The corium, which was widely exposed, is absolutely unprotected and in contact with the contents of the mouth. It is here densely infiltrated with small cells, probably leucocytes, and the remaining epithelium is over-nucleated.

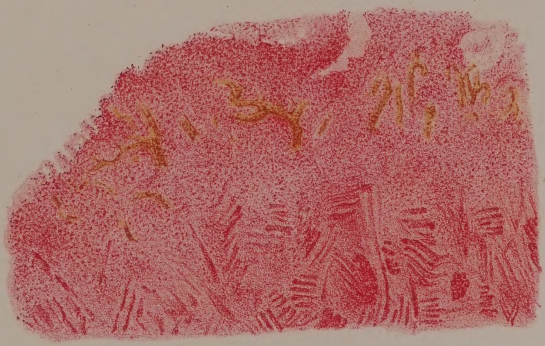
The section which is tinted with carmine was taken from the body of a woman aged 44, who died of tubercular peritonitis with much thirst and fever.

# Plate III.

×30

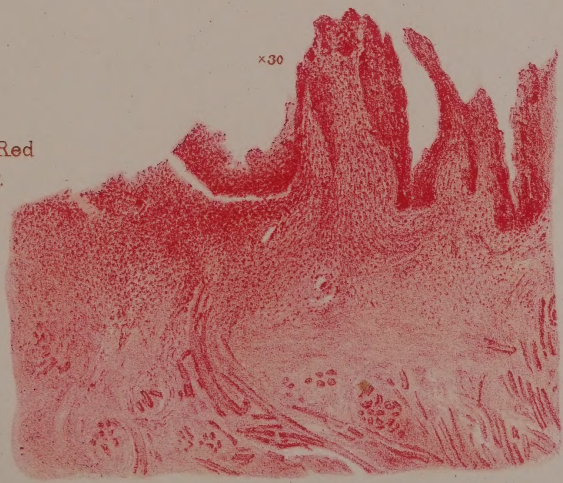
8.
Encrusted
Dry.

×35



9.
Becoming
Bare.

×30



10.
Denuded Red
and Dry.

Geo West, del.

Geo West & Sons, Chromo.

## DESCRIPTION OF PLATE IV.

*Class* 11.—Red, smooth, covered with membrane. To the naked eye red, dry, and smooth. The section shows a common appearance of the red smooth tongue, the covering of the level surface with a membrane which helps to make it so.

The summits of horny epithelium have been swept away, and a new straight layer of epithelium of this class has been carried along the tops of the papillæ, partly supported by the recent epithelium with which the intervals are filled. There is some superabundant cell formation in the epithelium and corium.

The section which is tinted with logwood was obtained from the body of a young woman who died of a discharging empyema associated with tubercular disease of the lung. There was, as in the preceding case, much fever of the hectic type.

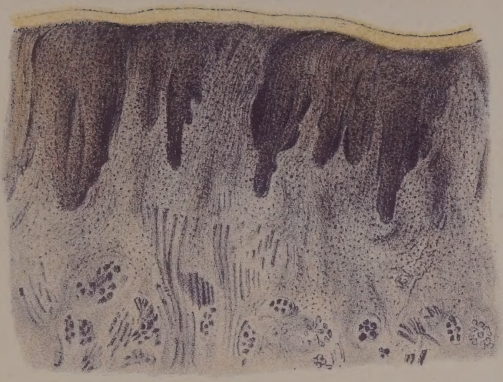
*Class* 12.—Cyanosis. The chief characteristic of this section is excess of deep epithelium together with injection and hypernucleation of the corium. Some superficial or horny epithelium is seen towards the surface, but this is mostly covered by the excessive growth of deep epithelium. Collections of micrococci are to be seen on the surface.

The last section presents a condition to which a separate class has not been assigned, as it intermixes with, and is inseparable from, others. It displays, as does Class 12, a remarkable increase of the deep epithelium, not in this case connected with mechanical or obvious congestion, but with chronic albuminuria. A lesser degree of the same change in similar circumstances is seen in the section which belongs to Class 4. Some processes of horny epithelium are to be seen on the surface.

The section which is tinted with carmine was obtained from a case of old granular kidney with uræmia.

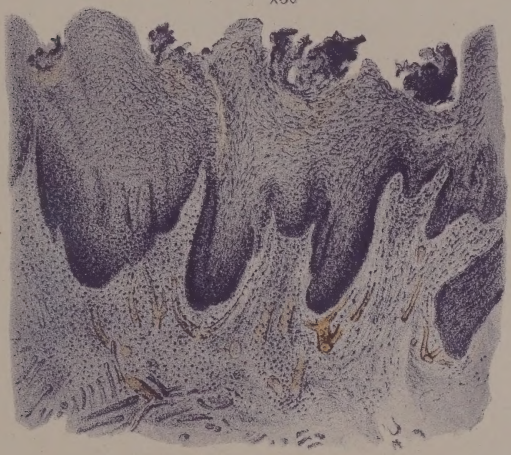
# Plate IV.

×30



11.
Red smooth and covered with Membrane.

×30



12.
Cyanosis.

×30

Excess of Deep Epithelium.

Geo West del.

Geo West & Sons, Chromo.

trivial were more often omitted than those which were striking or considered interesting; but they show, I believe correctly as far as they go, the kinds of disease associated with each. However inadequate, I think these records will be of use, helped out as they must be with a larger amount of unrecorded observation. Having described each tongue with its environment of disease, I shall next regard the association from the other point of view, and, taking a few typical diseases and constitutional states, shall show with what varieties of tongues they are accompanied. Finally, I shall draw together such general conclusions and rules of practice as the foregoing details appear to warrant.

I will now proceed to describe the healthy surface of the tongue so far as is necessary for the purpose in view.

## Class 1.—Healthy Tongue.

*Plate I. No.* 1.

The healthy condition of the tongue is by no means easy to limit or define. Not only does it change its aspect and character with often inconsiderable deviations from ordinary health, but it presents many differences within this state in different persons, and in the same person at different times. There are congenital varieties in the number and prominence of the papillæ, and there are such habitual differences, whether congenital or acquired, in the amount of epithelium, that to some persons it is normal to have a clean tongue, to others not less normal to have a coated one. Thus, whether the tongue be looked at with the naked eye or with the microscope, the range of health is wide; the same degree of coating may be normal in one person and abnormal in another, so that it is impossible to set up an exact ideal and say that all departures from it are the results of disease.

Nevertheless, some broad outlines may be adventured outside which pathology begins.

The shape, colour, and general appearance of the tongue in health are so well known that it is only necessary briefly to indicate what must be held to be consistent and what inconsistent with this condition. The shape is not too broad or the end too blunt, as with the flabby tongue of anæmia, of depression after alcoholic excess, and of many other asthenic conditions; nor is it indented with the teeth; nor is it narrowed and sharply pointed, as it is said to be chiefly with acute febrile and inflammatory states. The tongue should be protruded steadily and kept still, neither jerky nor tremulous. In colour it should present a basis or substratum of delicate pink, in which the forms of the papillæ are distinguishable by their shape, but not by hyperæmia or injection, which condition is conspicuous in many disorders, notably in scarlatina, as the chief characteristic of the strawberry tongue. The surface may be nearly clean or uncovered, but more commonly presents a superstratum which has been termed *fur* or *coating*, to the amount and character of which much importance has been attached. In ideal healthiness this is no more than a delicate white sprinkling or stippling, which may be likened to hoar-frost, a little speck lying as a cap or summit to each of the filiform papillæ, their extent not being enough to conceal but only to modify the general effect of the colour below. The filiform papillæ are more constantly coated than the fungiform; the circumvallate seldom. But this covering, even in perfect health, is not always, even not often, so limited. Sometimes it stretches between the papillæ, partially fills up the intervals between them, and spreads more abundantly on the central and back parts than at the sides or tip. The coat is nowhere excessively thick, nor enough quite to conceal the configuration of the surface; it thins gradually without

abrupt demarcation; it is not absolutely white, but is greyish where thin, yellowish where thick; the proper tissue, where exposed, is not of a bright but a dull pink, not exaggerated by injection, so that no striking contrasts of white and red are noticeable. The tongue and inside of the mouth are moist. Saliva can be voluntarily collected and spat out: it can be made to issue freely through a cannula in the parotid duct by placing a little acetic acid on the tongue.

To obtain an idea of the minute and essential changes which give rise to the altered appearances presented to the naked eye, it is not enough—it is, indeed, misleading—to be content with scraping the surface. It is needful to secure sections (see Plate I. No. 1) which show everything down to the muscular tissue; the amount, nature, and disposition of the epithelial investment must receive attention in its whole thickness, as well as the state of the corium with regard to injection, nucleation, and extravasation; and the characters of both apart from disease must be indicated. As the purpose is clinical, it will be enough to describe the upper surface, where what may be called the symptomatic changes are mainly observed.

Starting from within, and using the terms descriptive of the skin, which the covering of the tongue much resembles, we come first to the cutis vera, or corium, a layer of dense connective tissue between the muscular tissue and the epithelial. Projections from this form the central parts of the papillæ. The injection and nucleation of the corium are its chief points of morbid interest. The nucleation varies much, even in health; it is most abundant within the papillæ and near the surface. Upon the corium is the epidermis, of which there are three layers; the deepest is the rete Malpighii; upon this a stratum composed of lozenge-shaped nucleated cells, which correspond, with a difference, to the corneum of the

skin; and upon this a horny formation which is special to the tongue, and chiefly forms the white coat.

To take these separately, the rete Malpighii presents in contact with the corium a compact arrangement of columnar cells, in health little more than a single course, which are distinguishable, though not abruptly, from a bulky collection of polygonal cells which complete the Malpighian layer. Towards the surface these cells elongate and flatten, still remaining nucleated, and with rather a quick transition become squamous and form a layer which varies much in different circumstances, by which the surface of the tongue is generally covered. This corresponds with the corneum of the skin, though in the tongue, unlike what happens in the skin, the cells retain their nuclei. On the prominent parts, where the growth is oldest, notably on the ends of the papillæ, the cells undergo a further change, losing their nuclei and cellular form and becoming fibrous, losing their power of staining with carmine, but greedily absorbing the aniline dyes. It is this horny epithelium which essentially constitutes the coat or fur, and to which many of the clinical characters of the tongue are due.

The superstructure has but a brittle connection with the rete Malpighii, a line of fracture often presenting itself with much regularity along their junction; on the other hand, the rete Malpighii is intimately attached to the corium, so that not only abnormal, but even exceptional, circumstances are needed for their separation. The Malpighian layer is a very definite and constant structure—the chief landmark anatomically; what is above varies almost infinitely; the deep layer should not be quite bare, nor should the accumulation be such as to be level with, and so obscure the papillary eminences. The papillæ themselves commonly show each a tip of horny epithelium, white to the naked eye, yellow to the microscope. This varies much in health; so much in disease

that the characters of coating and furring mainly depend upon it.

On the surface of the tongue, attached mainly to the prominences of the epidermis, is a varying amount of parasitic growth, chiefly the micrococcus. This presents itself for the most part in the shape of rounded accumulations upon the outstanding fibrillæ, like the inflorescence of a bulrush. Besides this, there are often seen, especially about the papillæ, granular heaps of bacteria and other parasitic matters, as well as detached epithelial cells and accidental matters derived from food; but the total bulk of the accumulation, whether parasitic or accidental, bears but a small proportion to the epithelial structure of which the coat or fur essentially consists. The adventitious growth is rather an appendage to the coat or fur than a necessary part of it. In certain conditions of disease, of which more hereafter, the parasitic growth, as well as the epithelial, may be in great excess.

The characteristics of health in the mucous membrane of the tongue may be thus summed up. The corium must not be over-injected or over-nucleated, nor must it present numerously the extravasation of leucocytes. The Malpighian layer must display no excess of proliferation. The middle layer of epithelium, which corresponds to the corneum of the skin, must be present but not superabundant. It should completely cover the rete Malpighii between the papillæ, but should allow these to be prominent at their points of emergence. The epithelial processes of the papillæ should be distinguishable, but not too long; upon these may be a few scattered points of vegetation. Finally, the surface described must be exposed, not concealed by any coat or accumulation however derived, and it must be normally moist.

I need say little clinically about the healthy tongue. It will at once be seen that the healthy tongue is not the same thing as the tongue in health. There are individual

peculiarities in the growth of lingual epithelium in virtue of which some tongues are always coated, others not so when coating might be expected. With some persons a coated tongue is habitual, and not only consistent with health, but a sign of it. On the other hand, diseases like pneumonia, in which commonly the tongue is quickly and thickly coated, may fail to produce this result. It takes time to coat the tongue. In the table two cases of pneumonia are referred to with clean tongues. One was only in the second day and scarcely counts. In the other, a not very severe case of pleuro-pneumonia with a temperature of 102°, the tongue remained throughout so far clean that it could never be called otherwise than natural. It displayed a general fine white sprinkling, like April hoar-frost spread, which did not overcome the underlying tint. This absence of coat is quite exceptional in the circumstances, and probably shows habitual, but unusual, scantiness of the epithelial crop. There are also peculiarities in health which concern the saliva. An old woman, to be later referred to, displayed under capillary bronchitis a red dry tongue, from which I was disposed to augur ill. She got well and the tongue remained the same; she assured me that it had always been so, and I could only infer that the want of saliva, to which, as I shall presently show, the dryness and bareness of the tongue were due, was habitual and consistent with general health.

There are local and chronic diseases in abundance in which the tongue is normal; few involving pyrexia or any general disturbance. I shall show that this organ responds chiefly to constitutional variations. If the system at large is unaffected, so, as a rule, is the tongue. It is obvious that the conditions of observation in a hospital, whence my tables were chiefly derived, necessarily presented disease more abundantly than health, so that the morbid associations of the clean tongue are exaggerated.

1. Tongue not Abnormal.

| | |
|---|---|
| Tetanus | 1 |
| Chorea | 2 |
| Sunstroke | 1 |
| Valvular disease | 1 |
| Intra-thoracic aneurysm (dry diet) | 1 |
| Pneumonia (one on second day) | 2 |
| Pleuritic effusion (dry diet) | 1 |
| Pyo-pneumothorax | 1 |
| Phthisis | 1 |
| Whooping-cough | 1 |
| Ascites (hepatic): dry diet | 1 |
| Chronic albuminuria | 2 |
| Diabetes insipidus | 1 |
| Syphilis | 1 |
| Anæmia | 1 |
| Convalescent | 6 |
| (Total . . . 24) | |

Particulars Relating to the Above Cases.

| | |
|---|---|
| Pyrexia (temp. from 102° to 104°) | 2 |
| Hyperpyrexia (temp. over 104°) | 0 |
| Temperature not recorded | 1 |
| Prostration | 0 |
| Chiefly on liquid diet | 7 |
| Diet strictly limited to liquids | 0 |
| Dry diet | 3 |
| Saliva abnormally deficient | 2 |

Average temperature of 20 cases, 98·5°.

Died, 2; recovered, 8; relieved, 13; not relieved, 1.

## Class 2.—Stippled or Dotted Tongue.

*Plate I. No. 2.*

This presents the first deviation from health. There is an excess of coat or fur, not uniformly spread, but displayed only on the points of the papillæ. The term *fur* is perhaps more suited to an interrupted or punctiform covering than *coat*, which may be limited to one which is continuous; the fur, however, is here but a mere beginning, which may develop into the coated tongue or that which will be described as furred or shaggy.

Before proceeding to minute particulars, the naked-eye characters may be briefly indicated. The tongue in this phase presents merely an exaggeration or accentuation of the covering of health; the state may indeed be so nearly that of health that the difference may pass without notice. The tips of the papillæ are covered with white more closely and broadly than within healthy limits, and there is perhaps a little more than the normal contrast between the white summits and the pink intervals. The term *stippled* or *dotted* fairly describes the aspect of the dorsum. To borrow from the nomenclature of small-pox, the acquisition is discrete, not confluent. The spots on the papillæ are usually white, less often yellowish or brownish. The spotting is almost or quite absent on a narrow lateral margin, and also on a small triangular patch at the tip, the apex pointing inwards. These clear spaces are made so by the friction of the teeth at each side, and of the palate or gums at the tip.

The minute changes are to be made out only by examination in section. It is thus made evident that the essential alteration is in the amount and disposition of the epithelial covering. The change is in the way of excess, but the excess relates only to the condensed superficial structure, where the cells are flattened, fibrous, and rejective of carmine; not, or but very slightly, to the deeper parts, where the early shape and characters of recency remain. There is as yet no considerable or constant increase in the epithelium of the deeper sort, though there may be indications of a tendency in this direction; and here and there, but as yet not abundantly, excess of nucleation appears in the corium, especially about the papillæ. There is no marked injection of the blood-vessels. The intervals between the prominent papillæ are nearly empty, as in health. On their tips is commonly more or less parasitic growth, mostly the micrococcus, gathered, as it is apt to be, upon the projecting filaments. The proportion

which these parasitic products bear to the total thickness of the coat or fur can be seen only in section. By mere scraping of the surface a false impression is given of the amount of these superficial products. The crop bears only a minor proportion to the bulk of the coat, the major part of which is epithelial. The parasites are the fringe of the garment rather than the garment itself.

We see in this tongue mainly the evidence of disuse. The length of the papillary processes may be explained by the absence of customary wear, and, indeed, is exactly what want of friction and scour might be expected to cause. There is little evidence of overgrowth in the shape of new epithelium, but only a retention of what must necessarily be old. In the parasitic formation there is nothing special or peculiar, but only what is found in health in less abundance. As with the epithelium, what is indicated is rather the retention of what is old than the development of what is new. We may attribute the accumulation, whether epithelial or parasitic, to the absence of food connected with loss of appetite, and perhaps in some measure to the stillness of tongue which illness often engenders. I have referred to slight and early evidences of overgrowth of epithelium. This will become more apparent when I speak of more advanced changes.

This variety of tongue presents the first step in morbid acquirement and the first departure from health. A large number of persons could be found with this tongue whose condition is not abnormal. I have tabulated sixty-one cases in which this state of tongue was seen. All were hospital patients in whom absolute health was scarcely to be looked for; among them acute disease was infrequent, chronic disease common. Heart-disease was more numerously presented than any other disorder, occurring in seven. Pneumonia and pleurisy, taken together, were found also in seven; but among

these was only one instance of pneumonia in an active and pyrexial state. Rheumatism described as acute was present in five cases, but in only three was this adjective applicable in its fullest sense.

The general absence of pyrexia was striking: the temperature in only three cases reached 102°; in no case was it known to pass 103°. The diet in the large majority of cases comprised solid food. Three persons were kept for special reasons as short of liquid as was practicable. In these the saliva was markedly deficient—a deficiency which was noted in but four other instances. Extreme prostration existed in but one, together with acute obstruction of the bowel. Thus this tongue does not belong to pyrexia, and seldom concurs with grave constitutional disturbance of any kind. With the acute obstruction the temperature was normal. It presents itself often with local or organic disease, where there is little fever and seldom much vital failure.

Subjoining the cases where the stippled or dotted tongue was dry, and putting aside one where the dryness was due to diet, a larger proportion of acute disease and of constitutional disturbance is apparent when the tongue is dry than when it is moist.

2. Stippled or Dotted with White; Moist.

| | |
|---|---|
| General paralysis or paresis | 2 |
| Chorea | 1 |
| Hysteria | 2 |
| Neuralgia | 1 |
| Valvular disease of heart | 7 |
| Pericarditis | 1 |
| Pneumonia, pleuro-pneumonia, broncho-pneumonia | 6 |
| Pleurisy | 1 |
| Laryngitis | 1 |
| Bronchitis | 2 |
| Phthisis | 1 |
| Tonsillitis (follicular) | 1 |
| Acute obstruction of bowel | 1 |
| Fæcal accumulation in colon | 1 |
| Epistaxis, nostrils plugged | 1 |

| | |
|---|---|
| Jaundice | 2 |
| Ulcer of stomach | 1 |
| Dysentery | 1 |
| Chronic albuminuria | 5 |
| Diabetes mellitus | 2 |
| Hæmoglobinuria | 1 |
| Acute rheumatism | 5 |
| Subacute rheumatism | 2 |
| Acute gout | 1 |
| Chronic gout | 3 |
| Anæmia | 4 |
| Lymphadenoma | 1 |
| Acute alcoholism | 2 |
| Dry diet (1 for ascites, 1 for pleural effusion, 1 for cardiac dropsy) | 3 |
| (Total . . . . 62) | |

PARTICULARS RELATING TO THE ABOVE CASES.

| | |
|---|---|
| Pyrexia[1] (temp. 102° to 104°) | 3 |
| Hyperpyrexia (temp. above 104°) | 0 |
| Much prostration (acute obstruction of bowel) | 1 |
| Prostration not severe (pericarditis) | 1 |
| Chiefly on liquid diet | 10 |
| Strictly limited to liquid diet (acute obstruction of bowel) | 1 |
| Dry diet (liquids reduced as far as possible) | 3 |
| Saliva abnormally deficient (including 3 under dry diet) | 7 |

Average temperature of 42 cases, 98·5°.

Died, 15; recovered, 18; relieved, 25; not relieved, 3.

2 (D). STIPPLED OR DOTTED; DRY.

| | |
|---|---|
| Pleurisy with effusion (dry diet) | 1 |
| Peritonitis (opium) | 1 |
| Acute obstruction of bowel (volvulus) | 1 |
| Chronic albuminuria | 1 |
| (Total . . . . 4) | |

PARTICULARS RELATING TO THE ABOVE CASES.

| | |
|---|---|
| Pyrexia (temp. 102° to 104°) | 0 |
| Hyperpyrexia (temp. over 104°) | 0 |
| No observations as to temperature | 1 |
| Average temperature of 3 cases | 98·6° |
| Much prostration | 2 |
| Prostration not severe | 1 |

[1] The temperature was not noted in 13 cases; it may be taken in these as not materially elevated.

| | |
|---|---|
| Chiefly on liquid diet | 0 |
| Strictly limited to liquid diet (1 fed by bowel) | 2 |
| Dry diet | 1 |
| Saliva abnormally deficient | 0 |

Died, 1; recovered, 1; relieved, 2.

### Class 3.—Stippled + Coated.

The next step in the acquirement of coat is intermediate between the stippled and the coated, presenting a mixture of the characters of both. The white accumulation is present on the papillæ, but is not limited to them; at the back and along the median fissure it fills up the depressions, so that the tongue, while displaying the dotted character about the anterior and lateral parts, is at the back continuously covered, the continuity being implied by the term *coated*. This tongue is one of very frequent occurrence, perhaps more so than any other which can be regarded as morbid; it represents but a slight departure from health; since it partakes much of the class preceding, and of that following, it may be dismissed with brief description. A partial stippling may present itself as a stage either in the formation of coat or its removal; an example of the latter is seen in the drawing taken during recovery from pneumonia.

The microscope displays in a more marked manner the characters which have been described as belonging to the stippled class; the papillary processes are elongated and conspicuous, but there is in addition some increase of the deep epithelium by which the intervals are partly filled, the filling up made more complete by detached epithelium and accidental matters. Though the deep epithelium does not present to the naked eye the whiteness of the superficial or horny kind, yet the increase of the latter and the mixing together of the sloping ends of the papillæ give a continuity of whiteness, though only in the central and back parts, where the epithe-

lium is most plentiful. This tongue shows want of wear, together with more evidence of increased growth than in the preceding class.

Looking at this class clinically, we still find a large proportion of chronic disease, but note an increase of acute and constitutional affections. I may observe as an apparent exception that pneumonia is presented less numerously, though acute rheumatism is more so, and typhoid is now introduced. The change in the character of the cases is shown by the increase of pyrexia, though this is still slight compared with what will be seen presently, by the increase of constitutional depression, and by the number of cases in which the state of the patient was such as to necessitate liquid diet.

3. PARTLY STIPPLED; PARTLY COATED; NORMALLY MOIST.

| | |
|---|---|
| Bulbar paralysis | 1 |
| Cerebral hæmorrhage | 1 |
| Cerebral embolism | 1 |
| Hemiplegia (cause uncertain) | 1 |
| Giddiness | 1 |
| Chorea | 1 |
| Hysteria | 2 |
| Valvular disease of heart | 5 |
| Pericarditis (not rheumatic) | 1 |
| Pneumonia | 2 |
| Laryngitis | 1 |
| Bronchitis | 1 |
| Asthma | 1 |
| General tuberculosis | 1 |
| Phthisis with hæmoptysis | 2 |
| Ulcer of stomach with hæmatemesis | 1 |
| Cirrhosis of liver | 1 |
| Ascites (cause uncertain) | 1 |
| Anasarca (cause uncertain) | 1 |
| Diarrhœa | 1 |
| Constipation | 2 |
| Colic | 1 |
| Chronic albuminuria | 6 |
| Acute rheumatism | 7 |
| Subacute rheumatism | 2 |
| Chronic rheumatism, or sciatica | 2 |

| | |
|---|---|
| Gout | 3 |
| Congenital syphilis | 1 |
| Anæmia, chlorosis, etc. | 4 |
| Addison's disease | 1 |
| Ague | 1 |
| Typhoid | 3 |
| Erythema nodosum | 1 |
| Eczema | 2 |
| Pemphigus | 1 |
| Acute alcoholism | 1 |
| Abscess, internal, no discharge | 1 |
| Stricture of œsophagus | 1 |
| Convalescent | 2 |
| (Total | 69) |

Particulars Relating to the above Cases.

| | |
|---|---|
| Pyrexia (temp. 102° to 104°) | 6 |
| Hyperpyrexia (over 104°) | 0 |
| No observation as to temperature | 14 |
| Much prostration | 5 |
| Prostration not severe | 6 |
| Chiefly on liquid diet | 23 |
| Strictly limited to liquid diet (stricture of œsophagus, 1; diarrhœa, 1; constipation, 2; colic, 1; typhoid, 3) | 8 |
| Dry diet, liquids reduced as far as possible (ascites) | 1 |
| Saliva abnormally deficient (decidedly), including 1 under dry diet | 5 |

Average temperature of 54 cases, 98·7°.

Died, 7; recovered, 30; improved, 26; not improved, 5; uncertain, 1.

## Class 4.—The Coated Tongue.

*Plate I. No. 4.*

The next degree of epithelial excess, whether by retention or over-production, results in the formation of a continuous coat or one continuous over the greater part of the dorsum. This covering presents great variety and many indications to the naked eye. There is scarcely an acute or sub-acute disorder at some period of which the tongue is not coated: this holds good especially with febrile complaints. This state of the tongue is often a step to other changes in it, those often of more serious import. Two special varieties of coated

tongue will receive separate notice: the *strawberry* tongue, which, besides being coated, is much injected; and the *plastered* tongue, in which the coat is superabundant and has certain characters of recency. Putting these kinds aside for the present, the generally coated tongue is only an advance upon that which is partially so, just as the partially coated tongue is an advance upon that which is simply dotted.

In the ordinary varieties of coated tongue, the coat which is continuous between the papillæ covers the greater part of the dorsum, being thickest where friction is least, about the back and median furrow. It may be dirty-white, greyish, or yellowish. The limitation at the tip and edges is not abrupt; there are no striking contrasts of colour; neither is the coat very white, nor where it is absent is the mucous membrane vividly red. The fungiform papillæ may be visible where the coat is shelving, but they are not remarkably injected as with the strawberry tongue. Such a tongue may be anæmic or sodden-looking, especially when the patient is anæmic, the condition chronic, or associated with nervous depression. Good examples of the chronically coated tongue are presented in the drawings (shown to the College) from a case of floating kidney and neuralgia under morphia, and one from a case of chronic dysentery under opium. The coat may be variously tinted by accidental circumstances, especially by colouring matters, which are swallowed or vomited. It may be made bright-yellow or olive-green by bilious vomit, or brown by fæcal vomit. Iron will sometimes make it inky. Iron and port wine used alternately will sometimes convey a deep brown to the coat, tannate of iron resulting from this combination. I once knew an intensely black colour to be imparted to an otherwise light-coloured coat by artificial teeth. Probably some mercurial amalgam had reacted with sulphuretted hydrogen in the coat and produced the black colour.

The coated tongue may lose its coat in two ways: it may

gradually thin off with a shelving edge, exposing a moist and natural surface, or it may break away in flakes after displaying a surface which is red and dry; the former method, implying, as it usually does, the restoration of the healthy surface, is obviously of the better omen.

Often, in circumstances which will hereafter claim attention, the coat becomes dry, brown, and cracked, sometimes presenting rectangular fissures like crocodile's skin. This amounts to what I shall presently describe as the *encrusted tongue*, towards the making of which the coated tongue is a step.

Microscopic examination of the coated tongue shows as the essential change excess of epithelium of every kind. The papillæ are prominent, their pillars of corium stand well out, and upon them are long processes of the carmine-refusing epithelium, which is horny, superficial, and old. Between these protrusions is a superabundance of the full-bodied nucleated epithelium, such as belongs to the intervals by which these spaces are more or less filled up. In some cases this accumulation is surmounted by a thin layer which has undergone the horny transformation. When this is so, it easily accounts for the continuity of whiteness, since epithelium of this sort is, when moist, white to the naked eye. The continuity of whiteness, however, upon which the definition of the coated tongue rests, is more commonly maintained by the approximation of the long processes, and the filling of the intervals by accidental matters. There is as yet no marked injection, no great evidence of overgrowth in the Malpighian layer, no constant hypernucleation of the corium. What alteration of growth there is is in the direction of too much; but there is no such extravagance as will be noted in some conditions to be presently considered.

On and about the papillæ parasitic growths such as have been already described are often abundant, but as these are

not especial to this variety of tongue, nor add very materially to the bulk of the coat, they need no detailed notice.

Clinically, the coated tongue brings with it a further increase of acute and febrile disease. Taking together the moist and dry kinds, pneumonia or pleurisy was present in ten of sixty-eight cases; typhoid was slightly more frequent than in the preceding classes; while other febrile disorders now intrude themselves into the list. Pyrexia and prostration are both on the ascent, showing that the generally coated tongue is associated with a larger proportion of constitutional affection than where the coat is more partial. It was observed that the saliva was noticeably deficient in a larger proportion of cases than heretofore—in twelve of sixty-eight of the coated tongue, in only five of sixty-nine where the coat was partial.

4. Coated White; Normally Moist.

| | |
|---|---|
| Cerebral hæmorrhage | 1 |
| Hemiplegia (cause uncertain) | 2 |
| Pneumonia, pleuro-pneumonia | 6 |
| Pleurisy | 2 |
| Laryngitis | 1 |
| Bronchitis | 2 |
| Cancer of lung | 1 |
| Phthisis | 1 |
| Phthisis and hæmoptysis | 2 |
| Aneurysm (?) | 1 |
| Acute obstruction of bowel (small bowel) | 1 |
| Chronic obstruction of bowel (sigmoid flexure) | 1 |
| Diarrhœa | 2 |
| Ulcer of stomach (hæmatemesis) | 1 |
| Vomiting (uterine) | 1 |
| Dyspepsia | 1 |
| Repletion | 1 |
| Stricture of œsophagus | 2 |
| Starvation | 1 |
| Peritonitis | 1 |
| Chronic albuminuria | 1 |
| Uræmia, vomiting, suppression of urine | 2 |
| Acute rheumatism (including cardiac affection) | 1 |
| Sub-acute rheumatism (including cardiac affection) | 3 |
| Chronic rheumatism and sciatica | 1 |
| Typhoid | 4 |
| Febricula | 1 |

| | |
|---|---|
| Erysipelas | 1 |
| Erythema nodosum | 1 |
| Convalescent | 2 |
| (Total | 48) |

PARTICULARS RELATING TO PRECEDING CASES.

| | |
|---|---|
| Pyrexia (temp. 102° to 104°) | 9 |
| Hyperpyrexia (temp. over 104°) | 0 |
| No observations as to temperature | 5 |
| Much prostration | 11 |
| Prostration not severe | 4 |
| Chiefly on liquid diet | 11 |
| Strictly limited to liquid diet | 15 |
| No food by mouth; fed by rectum (stricture of œsophagus) | 2 |
| Dry diet | 0 |
| Saliva abnormally deficient | 6 |

Average temperature of 41 cases, 99·1°.

Died, 11; recovered, 15; improved, 21; not improved, 1

4 (D). COATED WHITE; PARTLY DRY.

| | |
|---|---|
| Hemiplegia | 1 |
| Myelitis (acute) | 1 |
| Valvular disease and disease of aorta | 2 |
| Pneumonia | 2 |
| Phthisis and pneumonia (?) | 1 |
| Acute obstruction of bowel | 1 |
| Tonsillitis | 1 |
| Dyspepsia | 2 |
| Repletion (surfeit) | 1 |
| Chronic albuminuria | 1 |
| Diabetes | 2 |
| Acute rheumatism | 5 |
| (Total | 20) |

PARTICULARS RELATING TO THE ABOVE CASES.

| | |
|---|---|
| Pyrexia (temp. 102° to 104°) | 6 |
| Hyperpyrexia (over 104°) | 0 |
| No observations as to temperature | 2 |
| Much prostration | 3 |
| Prostration not severe | 0 |
| Chiefly on liquid diet | 12 |
| Strictly limited to liquid diet | 3 |
| Dry diet | 0 |
| Saliva abnormally deficient | 6 |

Average temperature of 18 cases, 99·5°.

Died, 6; recovered, 5; relieved, 8; uncertain, 1.

### Class 5.—Strawberry Tongue.

This needs but a brief mention. Usually with what may be called the acute coated tongue, more especially when this approaches the plastered character to be next noticed, the fungiform papillæ show through the coat at the tip and edges. These are often more or less injected, especially with scarlatina, where they show in a striking manner the increased vascularity of the organ due to its participation in the cutaneous eruption.

The association with scarlatina would have been displayed more prominently in the table but that this disease is not, as a rule, admitted into St. George's Hospital. The strawberry state is sometimes seen in other disorders, most of which are of the acute febrile kind; pneumonia, typhoid, and perityphlitis are presented in the record. Injection of the tongue is an accompaniment of many febrile states, not only giving colour to the substratum but also promoting the epithelial growth. Pyrexia is generally present with the strawberry tongue, and that to a greater degree than with the antecedent classes.

5. Strawberry Tongue; Moist.

| | |
|---|---|
| Typhoid | 1 |
| Scarlatina | 3 |
| Pneumonia | 2 |
| Perityphlitis | 1 |
| (Total | 7) |

Particulars Relating to the above Cases.

| | |
|---|---|
| Pyrexia (temp. 102° to 104°) | 4 |
| Hyperpyrexia (temp. over 104°) | 0 |
| No observations as to temperature | 2 |
| Prostration not severe | 1 |
| Chiefly on liquid diet | 5 |
| Strictly limited to liquid diet | 2 |
| Dry diet | 0 |
| Saliva abnormally deficient | 3 |

Average temperature, 5 cases, 102°.

Died, 0; recovered, 2; improved, 3; sent out, 2.

## Class 6.—Plastered Tongue.

*Plate II. No. 6.*

The variety alluded to as *plastered* is well marked, has much clinical importance, and demands a separate notice. Clinically, this might be called the coated tongue of acute disease. The coat, which is white, moist, though generally not fully so, and uniform except at the edges, is spread over the dorsum, excepting a narrow margin and a small space at the tip, with a thickness, smoothness, and definite limitation which suggests the laying on of plaster. The edges, though definite, are somewhat bevelled, and are perforated as they thin with the red fungiform papillæ, after the strawberry style. Sometimes, as in the drawing displayed, taken on the fourteenth day of typhoid, the covering is so white, thick, and fine in grain as to give the idea of plaster-of-Paris or white lead smoothly spread; at other times it is coarser and less purely white, as if a fine kind of mortar had been used. The mucous surface where exposed is often redder than natural, especially when the coat is of the whiter kind. The more recent the illness the whiter the coat. When very thick, white and strongly contrasted with the red margin, the indication is of acute disease—in other words, of disease recent and severe. Were it not recent the coat would not be so purely white; were it not severe the thickness could not have come in the time. Each day the tongue becomes less white, and gradually assumes a dirty yellowish or brownish tint. A brown colour associated with dryness and cracks commonly appears when the disease is severe, of long continuance, and attended with prostration. The properties of brownness and dryness may accompany many states of tongue, and will receive further notice.

I may in a few words indicate wherein the minute cha-

racters of the plastered tongue differ from that which is commonly coated. The difference is mainly one of degree. The papillæ are now more elongated, even so much so as to resemble those of the shaggy or furred tongue. With this we have more complete filling up of the intervals, and even some overlying of the papillæ, with matters partly derived from the tongue itself as epithelium, partly parasitic and partly accidental. This condition is a great way towards the *encrusted tongue*, the chief difference being in the presence or absence of moisture. The plastered tongue when dry becomes the encrusted. In the plastered tongue the hypertrophy of the superficial epithelium, as yet uncomplicated to any great extent, attains its climax.

Clinically, this tongue never fails to arrest attention; it is the ensign of recent acute febrile disease. The chronic coated tongue is distinguishable from the plastered by its dirtier colour and the less vivid apposition of white and red. Of thirty-two cases of the plastered tongue, the table shows eight of pneumonia, three of acute bronchitis, three of acute rheumatism, six of typhoid, and four of other acute febrile affections. Pyrexia was marked in eighteen cases, while the general average of temperature was 101·6°, a higher level than has yet appeared, save with the strawberry tongue, a nearly allied condition. Prostration, mostly such as belongs to the febrile state, was recorded in eight; while the increased proportion of patients on liquid diet bears testimony to the same association. The saliva was noticeably deficient in a larger proportion of instances than with any tongue yet before us, save the small strawberry class. This does not imply merely that the tongue was dryish, which might be due to the evaporation caused by the increased heat of the body, but to lessened secretion, as was in some instances ascertained with the cannula. We see a close association with pyrexia which stimulates cell-growth, and is probably

the chief agent in producing the characteristic epithelial luxuriance, the products of which are abnormally retained partly by reason of the scantiness of saliva.

6. White; Plastered; Moist.

| | |
|---|---|
| Cerebral tumour | 1 |
| Pneumonia, pleuro-pneumonia | 8 |
| Bronchitis (acute) | 3 |
| Phthisis and hæmoptysis | 1 |
| Stomatitis | 1 |
| Acute obstruction of bowel (volvulus) | 1 |
| Dysentery | 2 |
| Perityphlitis | 1 |
| Jaundice (enlargement of liver) | 1 |
| Acute rheumatism (including pericarditis, etc.) | 3 |
| Typhoid | 5 |
| Febricula (or febrile attack of uncertain nature) | 1 |
| Measles | 1 |
| Mumps | 1 |
| Pyæmia | 2 |
| (Total . . . 32) | |

Particulars Relating to the above Cases.

| | |
|---|---|
| Pyrexia (temp. 102° to 104°) | 15 |
| Hyperpyrexia (over 104°) | 3 |
| No observations as to temperature | 5 |
| Much prostration | 5 |
| Prostration not severe | 3 |
| Chiefly on liquid diet | 16 |
| Strictly limited to liquid diet | 8 |
| Dry diet | 0 |
| Saliva abnormally deficient | 13 |

Average temperature of 27 cases, 101·6°.
Died, 10; recovered, 11; improved, 11.

Before proceeding to other varieties of tongues, I will, now that we have reached in the plastered tongue the climax of simple coating, look back upon the several grades of that condition, and try to collect the instruction which flows from them.

First pathologically. The most important item is the lengthening of the papillæ; and the first question, how far this depends on disuse from want of food, etc., and how far

on overgrowth. Want of wear must have some effect in allowing this elongation, but it would seem to be too rapidly produced to be wholly thus accounted for. A greater length is attained within the short duration of an acute disease than in the longer time of a chronic one, even though it entail more complete disuse. Not only are the epithelial ends to which only the wear applies elongated, but so in many cases are the deeper parts of the column which are unexposed. The epithelium also between the papillæ, which, as being less exposed than they are, must be less influenced by wear, is also in many cases increased in thickness; when it is so it gives strong evidence of over-production as against deficient removal. Coating, therefore, is the result in part of disuse, want of rubbing and washing, as the somewhat increased surface parasites show, but chiefly of morbid overgrowth.

The clinical circumstances give similar evidence. It is true that the greater degrees of coating occur chiefly in patients who are kept without much solid food. On the other hand, in many conditions in which solid food and mastication are almost completely absent, the thick and rapid covering of acute disease does not present itself. I have watched with interest from this point of view cases of stricture of the œsophagus. In three such only the lower degrees of coating were presented, though in all solids were impossible, and in two food was introduced chiefly by the bowel. In a fourth the tongue was dry and furred, but the furring came on with dryness, on which it was apparently dependent. I shall revert to the influence of diet upon the tongue, and simply say here that a comparison between the thinly or partially coated tongue of simple abstinence, and the thickly and generally coated tongue where a less degree of abstinence is associated with a febrile state, shows conclusively, as it appears to me, that in the latter condition we have something to look for beyond inaction.

I shall refer later to the effects upon the tongue of the limitation of liquid, but it is enough for the present to say that want neither of food nor of drink avails to produce the thick coating which in other circumstances is so characteristic.

A condition which may be briefly referred to in connection with coating of the tongue is diminution of saliva, though I shall consider this subsequently on a wider basis. As a general rule, whatever be the reason, the saliva lessens as the coat thickens. Taking together the lesser degrees of coat presented with the stippled, and stippled and coated classes, this secretion was notably deficient in twelve of 170 cases. Taking together the higher degrees of coat in the strawberry and plastered kinds, the saliva was notably deficient in sixteen of thirty-nine. Thus generally up to this point, the less saliva the more coat. But it will appear later that almost total absence of this fluid may concur with a tongue which is almost absolutely without coat. For the present it is enough to point out that the deficiency does not alone account for the excess of covering under consideration.

To account for this there remain but two courses which present themselves as probable: the hypothetical existence of a morbid poison as in fevers, and pyrexia. The existence of a morbid poison as a cause of coating of the tongue is suggested by the specific febrile character of many of the cases where it is well marked; we may not be able to explain any direct connection between poison and coat, but must not on that account too hastily assume that there is none. That there is an indirect connection through pyrexia will become evident. To come to details, looking at the high degrees of coat in the classes of strawberry and plastered, I find that of thirty-nine such cases fourteen were of typhoid, febricula, scarlatina, measles, mumps, or pyæmia, and three of acute rheumatism. Thus, unless we include pneumonia, of which

there were ten cases, less than half fell within the hypothesis of poison. Among the rest were many cases of local or organic disease, which were clearly outside this supposition. Among these were three cases of acute bronchitis, one of phthisis, two of perityphlitis, one of volvulus—enough to show that local disease, or disease not connected, so far as we know, with any blood-contamination, may give rise to what may be called acute coating of the tongue.

Pyrexia remains to be considered. When the tongue is normal, so, as a rule, is the temperature. I have already referred to one case as exceptional in which the tongue remained clean in the presence of pneumonia. Putting this aside, I have already referred to twenty-two cases in which, in different circumstances, the tongue was reasonably clean, the temperature was raised only once, and then only to 101·5°. Taking, now, the degrees of coating in ascending order, we find that as the coat increases so with almost exact correspondence does the temperature.

RELATIONS OF BODY HEAT TO COATING OF TONGUE.

| Class of tongue | Percentage with pyrexia | Average temperature |
|---|---|---|
| Stippled . . . . | 4·9 | 98·5° |
| Stippled and coated . . | 8·6 | 98·7 |
| Coated, moist . . . | 18·7 | 99·1 |
| Coated, dry . . . . | 30·0 | 99·5 |
| Strawberry . . . . | 57·1 | 102·0 |
| Plastered . . . . | 53·1 | 101·6 |

The annexed statement needs no explanation; whether we look at the frequency of pyrexia in the class, or at the average temperature of all cases in it, the figures are equally significant. Taking the strawberry and the plastered tongues as practically the same, the proportion between coat and heat is maintained with remarkable exactness. And we have as yet failed to find any other condition besides heat of body which has so uniform a relation to the alteration in question.

That heat up to a certain point promotes the growth of cells is a fact well known to experimental physiologists. I take it on the authority of Dr. Delépine that a temperature of between 100° and 104° is favourable to the growth of tissues, one of above 105° detrimental to it. It probably very rarely happens that the dorsum of the tongue, exposed as it is, and necessarily cooler than the constantly covered parts, reaches a temperature high enough to lessen growth; almost any degree of elevation possible to the tongue in our present surroundings must be within the limits of that which tends to increase. In pyrexia, therefore, we have, if not the only maker of coat, certainly the chief one.

## Class 7.—The Furred or Shaggy Tongue.

*Plate II. No. 7D.*

As the papillæ of the coated tongue continue to lengthen, and adventitious matter to collect between and upon them, the advancing process presents itself in two shapes, which differ as the elongation or the accumulation preponderate. When there is great projection of the papillæ, so that these stand out distinctly, the terms *furred* or *shaggy* represent the condition. When these shapes are covered in, and levelled over by matter, whether derived from the tongue itself, or from without, the term *encrusted* may be employed. The two conditions occur in many similar circumstances, and are continually intermingled; nevertheless, they occur separately, and must be so described. A stippled or dotted tongue by increase of each point of coating may become furred, a process which dryness facilitates. In a different way a thickly coated tongue may become furred. The lengthened papillæ may present themselves as a coarse pile-like plush, and so make the *moist furred tongue*. A little

drying will cause the threads to collect into sheaves, and so form the *dry furred tongue* which I am about to describe.

To the naked eye and during life the fore part is irregularly rough, with large pointed papillæ, on the tips of which are brown spots, or the whole may be more or less brown. The central and back parts are often covered with irregular pointed masses, such as are represented in the drawing (exhibited), frequently more or less mixed up with and obscured by dry crusts, often like crocodile's skin. I have seen after death (in a case of malignant disease of the larynx) much of the hinder region of the tongue covered with a shaggy villous growth, like coarse hair; but in life this hirsute state is commonly much obscured by incrustation.

Under the microscope the chief characteristics of the tongue are the enormously elongated filiform papillæ, every part of which is increased, both the deeper portion derived from the corium and the superficial epithelial part, the latter most so. Micrococci are sometimes present on the tips of the papillæ, but do not add materially to their bulk.

The elongation may conceivably be due either to overgrowth or deficient removal; there is often some increase of the deep epithelium, but seldom much; occasionally some over-nucleation of the corium is present. In fine, there is some evidence of hyperplasia, but not enough to account for the striking changes which the tongue presents. These would seem to be mainly due to want of wear, of which the papillary ends, hardened by dryness, are especially resistant. Beyond the resistance which dryness entails, it is possible that the unnatural state of surface which goes with it may act as an irritant and stimulate growth.

As to the clinical relations of this tongue, I have been able to collect, notwithstanding the generality of dryness, a few instances in which the furred tongue was moist, or at least not dry. One of these was of a kind sometimes seen

where great elongation of the papillæ is consistent with appetite and health. The only conditions which could be suggested as provocative of the state of tongue in this case were old age and constipation. I have referred to the state of pile, which may be regarded either as an advanced stage of the coated tongue or an early one of the furred. In the table it is seen to be associated with pneumonia and with anæmia.

The *dry* furred tongue is of more importance than the moist, but it occurs in different circumstances and is by no means uniform in its indications. It may succeed, as has been shown, either upon the dotted tongue or the coated, in the course of advancing disease; it may also occur with retrogressive disease, as when the encrusted tongue sheds its coat so as to expose the subjacent elongated papillæ. The class therefore presents much clinical variety. It has been shown that the furred or shaggy tongue is largely the result of disuse and want of moisture, which latter condition is nearly essential, though not absolutely so. The papillæ harden with dryness, as has been stated, and become abnormally resistant of friction, which in the absence of solid food and mastication is diminished. The saliva is obviously deficient, as judged by the difficulty of spitting and by the results of catheterisation of the parotid. It must be stated, however, that the later operation was not often performed, the extreme illness of the patient often opposing a hindrance. The fact, however, was clear without this test; and the conclusion warranted that the dryness was in general due to want of this secretion.

The accompanying tabulation speaks for itself. I need not allude again to the instance where a profuse hirsute growth was conjoined with sarcoma of the epiglottis and tonsil; here the results of want of friction were chiefly evident, though there was some evidence of overgrowth in

hypernucleation. I may next refer to a group of cases in which, as presumably in the last case, the condition was present with little or no pyrexia. This includes two cases of coma from brain-disease, two of advanced cirrhosis, one of enlarged liver of uncertain nature, two of diarrhœa, and three of enforced dry diet. Thus dehydration, be its cause what it may, is a definite factor in producing the tongue in question. In other cases—to wit, typhoid and acute rheumatism—pyrexia was present, but it is clear that this is not essential. It is worth observing how infrequent is pyrexia, and how low its range in the dry tongue now in question, as compared with the plastered moist tongue last discussed. This shows how little of the desiccation is to be attributed to evaporation connected with increased heat of body. And I may make a similar negation with regard to another condition to which dryness and furring have been attributed—namely, habitual openness of the mouth, especially during sleep; I find but three instances in which this attracted notice, and I am persuaded that other causes of drying and furring are far more important.

In short, the dry furred tongue is essentially due to two causes which are connected together—want of saliva and want of wear. Among the causes of want of saliva, the most important is a state of system which cannot be otherwise defined than as failure of nutrition and vital power. With how great a variety of disorders this failure is associated I need not recapitulate; I have expressed the greater degrees of it by the term 'prostration.'

7. Furred or Shaggy; not Dry.

| | |
|---|---|
| Pneumonia, pleuro-pneumonia | 2 |
| Perityphlitis, perforation of appendix | 1 |
| Chronic constipation | 1 |
| Granular kidney; uræmia | 1 |
| (Total | 5) |

Observations Relating to Preceding Cases.

| | |
|---|---|
| Pyrexia (temp. 102° to 104°) | 1 |
| Hyperpyrexia (temp. over 104°) | 0 |
| No observations as to temperature | 2 |
| Average temperature (of three cases) | 99·8° |
| Much prostration | 2 |
| Prostration not severe | 0 |
| Chiefly on liquid diet | 2 |
| Strictly limited to liquid diet | 1 |
| Saliva abnormally deficient | 2 |

Died, 3; recovered, 1; not improved, 1.

7 (D). Furred or Shaggy; Dry.

| | |
|---|---|
| Disease of brain (coma) | 2 |
| Hemiplegia (embolic) | 1 |
| Chorea | 1 |
| Valvular disease | 1 |
| Aneurysm or dilatation of aorta (dry diet) | 3 |
| Broncho-pneumonia | 1 |
| Pleurisy | 1 |
| Cirrhosis of liver | 2 |
| Enlargement of liver (cause uncertain) | 1 |
| Stricture of œsophagus | 1 |
| Diarrhœa | 2 |
| Perityphlitis | 1 |
| Abscess (in axilla) | 1 |
| Acute rheumatism | 1 |
| Typhoid | 1 |
| Convalescence from typhoid | 1 |
| Febricula | 1 |
| Movable kidney and rheumatism | 1 |
| Chyluria | 1 |
| (Total | 24) |

Particulars Relating to Preceding Cases.

| | |
|---|---|
| Pyrexia (temp. 102° to 104°) | 3 |
| Hyperpyrexia (temp. over 104°) | 0 |
| No observation on temperature | 2 |
| Average temperature of 22 cases | 99·1° |
| Much prostration | 6 |
| Prostration not severe | 2 |
| Chiefly on liquid diet | 9 |
| Strictly limited to liquid diet | 5 |
| No food by mouth (fed by rectum) | 1 |
| Dry diet | 3 |
| Saliva abnormally deficient | 8? |

Died, 9; recovered, 7; relieved, 8.

## LECTURE II.

### Class 8.—Encrusted Dry and Brown Tongue.

*Plate III. No.* 8.

Mr. President and Gentlemen,—The variety about to be described is distinct enough, though it has points of contact with the two preceding classes, as a later stage of which it presents itself. The essential characteristic is the covering of the tongue with a brown dry crust, which surmounts and conceals the papillæ. It occurs as a later stage of the furred tongue, the spaces between the elongated papillæ getting filled up, as it would seem almost necessarily, and the accumulation carried up so as to level or overtop their summits. It occurs also as a later stage of the coated tongue, more particularly of that kind which has been described as plastered, the growth of the papillæ and of the epithelium in the intervals and the accumulation of parasites on the dry surface producing the result.

To the naked eye the characters of the encrusted brown and dry tongue are almost sufficiently described by these three words. It is irregularly covered with brown dry incrustation, variously broken and fissured. Sometimes the cracks are quite irregular; often the deeper are transverse, with longitudinal longer and shallower fissures, which together divide the crust into more or less rectangular scales. The surface, particularly in front, often displays, instead of incrustation, coarse elongated papillæ which are antecedent to it, while towards the back and central parts the coat covers

and conceals these prominences. The colour is generally brownish and the upper surface rough and dry, while the under part is smooth, uncoated, and only clammy. The teeth are often encrusted with brown matter.

It may be asked why is the encrusted tongue brown? Firstly, because it is dry. Many animal substances dry brown, among others the white coat of the tongue. I have dried a thickly coated white tongue at the temperature of 100°, and also at that of an ordinary room. When dry it became brown, but not completely so. A brown, dry, encrusted tongue when soaked in water became nearly white, but not quite, and brown as before when re-dried. Thus dryness appears to be in part a producer of brownness, but staining by food and medicine no doubt helps. Many coloured matters—beef tea, wine, &c.—go into the mouth of a sick man, and cannot but discolour the tongue if the natural wash by saliva is wanting. The crusts on the teeth are probably similarly produced. They are not due to the drying of saliva on the teeth, for saliva at the heat of the body dries white.

With the microscope the chief points are the elongation of the papillæ, and their being embedded and overlaid by a heterogeneous brown mass, which will be further noticed. The incrustation differs from what has been shown to form the coat or fur, though attached to it so as to be inseparable without fracture. Traced in section from within outwards, it presents first much epithelium, more or less horizontally arranged, flattened, but usually not old enough to have lost the power of taking carmine. Through this project long papillæ, chiefly consisting of horny, untinting epithelium, upon the exalted summits of which rests a confused mass which constitutes the crust. While the tops of the papillæ support this material, their intervals are filled up by it. Thus there are two constituents of the covering of the encrusted tongue: first, a large growth or accumulation of epithelium,

much of which is in the shape of elongated papillæ; and, secondly, a less definite structure, which lies upon this and in its interspaces. The superimposed substance is mixed and irregular; much of it can be described only as amorphous; in it can be distinguished epithelial cells disposed without regularity, fat-globules, occasionally other adventitious and accidental matters, and last, not least, a multifarious collection of organisms, chiefly vegetable. In two cases, in one during life, in the other after death, I found lying on the tongue large detached masses of dry brown crust, one of which was not less than a quarter of an inch thick. Sections of these prepared in different ways were examined; I show a diagram representing one of these sections made from a drawing which I owe to the skilful hand of Dr. Delépine. Both masses showed a profusion of vegetable organisms, chiefly micrococci and the *Oïdium albicans*. I am indebted to Dr. Delépine for a minute description of these organisms which I insert below.[1] Besides these, there were many strands of horny or superficial epithelium, many epithelial cells of the deeper kinds, many fat-globules, and much indeterminate matter. The dry incrustation differs from the white moist coat chiefly in this: whereas the major bulk of the white coat is epithelial, a very large proportion of the dark dry crust is parasitic. In the deeper parts of the

[1] The organisms found in the fur belong chiefly to the two following forms:

1. Masses of micrococci.
2. Branching septate filaments, ending in large spore-like cells.

The second form of organism must be referred to the class of Hyphomycetes fungi, and probably to the species or variety called *Oïdium albicans* by Robin. A great portion of the growth, however, has all the characters of one of the Blastomycetes; this, however, is not surprising when the views of Grawitz, Cienkowski, Naegeli, and others are kept in mind. Grawitz, for instance, says that *Oïdium albicans* is nothing else than a modified yeast (*Mycoderma vini*); Naegeli maintains that there is no difference between the genera Torula and Mycoderma.

It may be also remembered that spores like those observed in this case were said formerly to belong to an alga (spurious), the so-called *Cryptococcus cerevisiæ*.

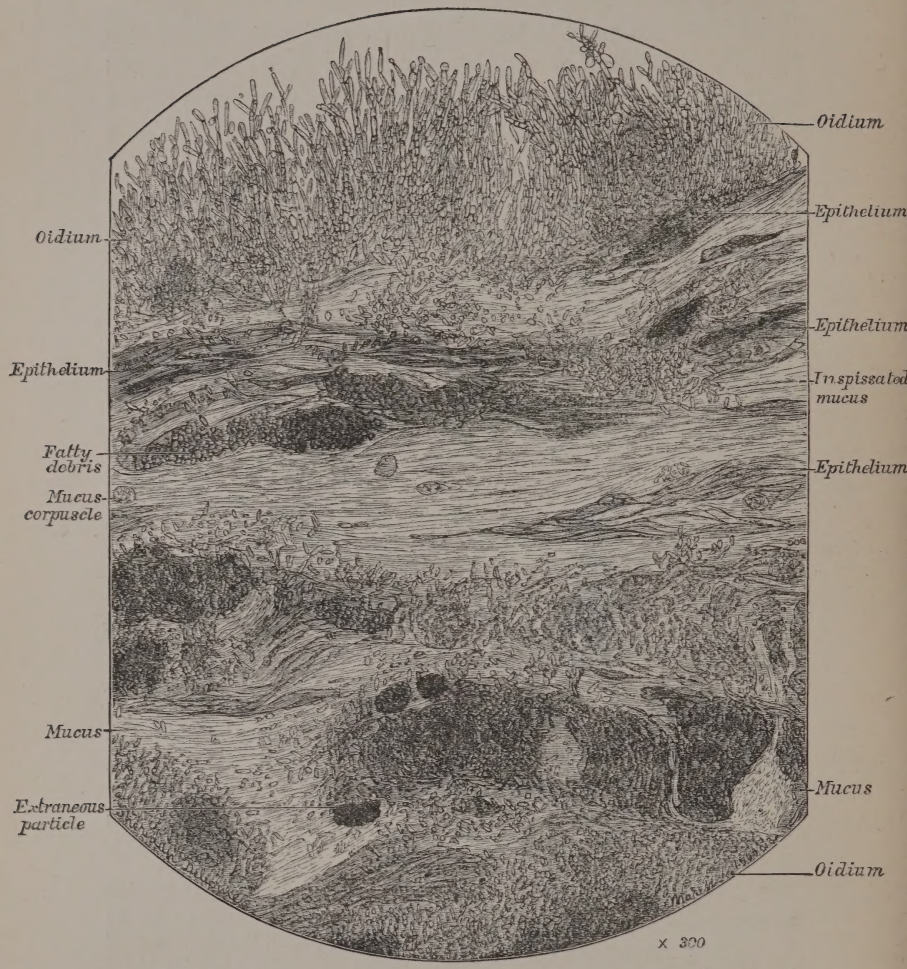



FIG. 1.—Transverse section of flake of coat spontaneously detached from dry encrusted tongue from a man who died of sarcoma of the lung under the care of Dr. Cavafy. He was about a week dying, with open mouth and muttering unconsciousness. The flake was found after death; it was about a quarter of an inch thick, and looked like a cinder.

epithelial structure, more especially in the Malpighian layer, there is often much profusion of nucleation or cell-growth, the corium is in many cases distinctly hypernucleated and often over-injected. More rarely leucocytes are extruded within the papillæ and elsewhere.

To sum up the evidence afforded by the morbid anatomy

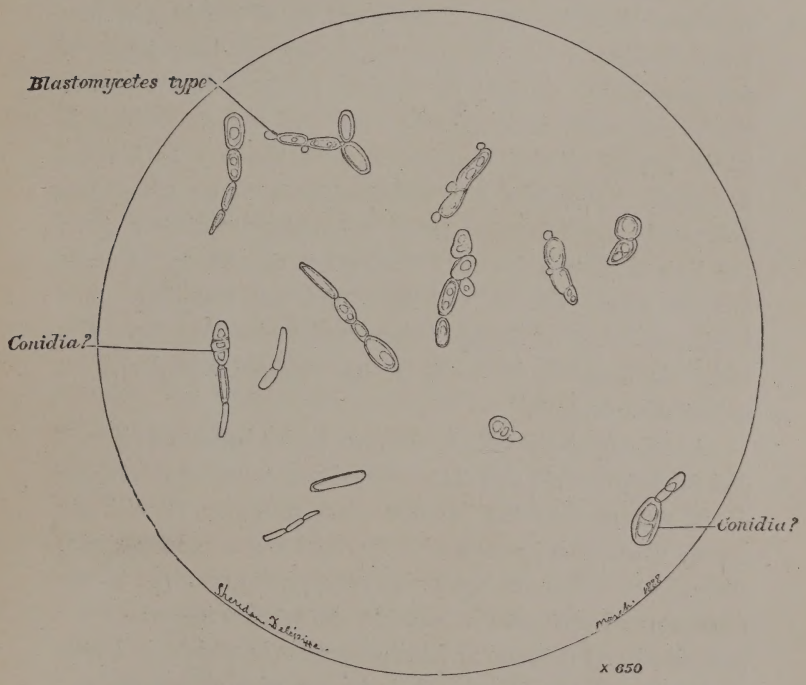



FIG. 2.—Organisms from the same section more highly magnified.

of the encrusted dry tongue, we see first the results of the absence of friction and irrigation, most conspicuously in the accumulation which forms the crust. It is probable, also, that the elongation of the papillæ may be partly attributed to this cause. But there are also signs of increased cell-formation and nutrient activity, so that we witness here

a double process, over-production conjoined in larger measure with deficient removal. It is obvious that the dryness which helps to define this tongue has played an important part in it, both by want of scour and also by induration.

Coming to clinical considerations, much that has been said about the furred tongue applies also here. It will be convenient to take together two classes which, though I have separated them for some of the purposes of the inquiry, are not to be distinguished save as the earlier and later stages of the same state. I shall for clinical purposes fuse together the tongue which is completely encrusted and that which is in the process of shedding its crust in the way to become denuded. So various are the conditions under which the encrusted tongue is seen that it is not easy to discern what the link of association may be, except the somewhat loose one of severe illness, and that of some standing. The instinctive sense of the physician carries him thus far. His looks are ominous, he talks of the 'typhoid state,' and he orders stimulants.

Analysing the details in the two tables before us (Nos. 8 and 9, see pages 65 and 71), comprising together thirty-five cases, pneumonia takes the first place in frequency with six cases; then come pyæmia with four and continued fever with three. Acute rheumatism with hyperpyrexia occurred in one instance, and erysipelas in one. In short, there is scarcely any protracted and depressing febrile disorder in which, if I may supplement the scanty records before us with unrecorded experience, this tongue is not apt to be developed. It is often characteristic of typhus by means of the black colour it then presents—possibly due to hæmorrhage into the coat (but of this I cannot speak from observation). The encrusted tongue is so commonly looked for in advanced typhoid that it is often spoken of as the 'typhoid tongue,' though by no means the only variety displayed in this disease. But the associa-

tion with fever does not contain the whole story, nor is the febrile condition essential. This tongue may concur with its complete absence. The abstract shows that of the thirty-four cases in question fifteen displayed a temperature above 102°, eight a temperature under 99°, in three of which it was subnormal. The low temperature was manifested with abdominal cancer, advanced phthisis, albuminuria, syphilitic mania, diarrhœa, alcoholism, and prostration from an unknown cause. Thus pyrexia, though often present with the encrusted tongue, and no doubt by the evaporation which it entails helpful to its production, is by no means necessary to it. The average temperature is lower than with the plastered tongue. It is scarcely needful to inquire, after what has been said, whether this tongue is to be generally attributed to openness of the mouth during sleep or coma. The dry encrusted or furred tongue—for the two have similar clinical relations—is an especial property of coma or insensibility. I have not recorded any case in which well-marked coma persisted for more than twenty-four hours without one or the other being developed. The records are scanty, but a larger experience supports the general rule that with coma or long unconsciousness the tongue becomes as described. Many reasons are obvious—dryness and disuse the chief. But why the dryness? It is manifest that coma, if it involve habitual openness of the mouth, must tend to dry the tongue; but if health is good in general respects, it does not appear that the mere passage of air over the tongue in respiration can produce anything like the degree of desiccation in question. I have noticed how little dryness has resulted in a person otherwise well whose nostrils have been surgically plugged, and we must take another point of view. Coma, however it acts, is connected with only a minority of cases in which the tongue becomes dry and encrusted. Putting aside all states of coma and unconsciousness, all in which the

mouth has been habitually open from other causes and all states of pyrexia, there remain many conditions, and those most various, in which this tongue has presented itself. Advanced phthisis, intra-thoracic and abdominal cancer, idiopathic anæmia, and diarrhœa have been mentioned; all were attended with much depression or prostration, and, indeed, it appears that, whatever else be present, a condition of much illness or lowered vitality runs through all and supplies the common factor. It has been shown that a similar condition of prostration often attends the furred tongue. I should have preferred to have been more explicit, but it is not easy to narrow the statement within a more strict definition. To most of the conditions the term 'sinking' would be applied as indicating what is present or threatened. There is not necessarily any loss of consciousness nor any obvious failure of the nervous system. Sense and senses may be alike unimpaired. There is, as a rule, failure of circulation, of muscular strength, and of nutrition. Perhaps the term 'asthenia' best implies the state. Any disturbance may be superadded, but none other is generally essential. I say *generally*, for direct dehydration will cause the state of tongue in question. This is seen in the effects of dry diet, and perhaps less simply in the effects of diarrhœa. It is to be observed that exhaustion by suppuration, as will be seen, causes other changes in the tongue than this.

It has been shown that the essential local change is dryness, and that this, as a rule, is not due to direct dehydration or to increased evaporation from pyrexia or patency of the mouth. That it is due to deficient secretion of saliva is a necessary conclusion, warranted by the obvious deficiency of liquid in the mouth, by the difficulty or impossibility of spitting, and by the usually fruitless result of catheterisation of the parotid, notwithstanding that acetic acid may be applied to the tongue as a stimulant to the gland. I shall

revert to this point, but am not wrong so far in assuming the dryness to be, as a rule, due to suppression of this secretion. Associating this with the asthenia which accompanies it, we cannot but regard the local as the result of the constitutional state, and probably may accept it as a sign that the prostration is telling upon the functions of at least some of the organs. The bowels, kidneys, and skin do not obviously participate in the failure; but how about the gastric and other digestive juices? Observations here are difficult or impossible, but it may be conjectured that the salivary failure does not stand alone, and we may accept the state of tongue before us as an index not only of asthenia, but of a failure of certain vital functions connected with nutrition.

8. Encrusted, Dry, and Brown.

| | |
|---|---|
| Pericarditis, hydrothorax, tapping often | 1 |
| Pneumonia | 2 |
| Phthisis | 1 |
| Cancer of lung | 1 |
| Block in rectum and hepatic ascites | 1 |
| Choleraic diarrhœa | 1 |
| Granular kidney and uræmia | 1 |
| Uræmic coma | 1 |
| Diabetic coma | 1 |
| Obstructive jaundice | 1 |
| Cancer of pancreas, &c. | 1 |
| Acute rheumatism | 1 |
| Idiopathic anæmia | 1 |
| Typhoid | 1 |
| Typhus | 1 |
| Erysipelas | 1 |
| Pyæmia | 3 |
| Rapid emaciation, cause uncertain | 1 |
| Alcoholism | 1 |
| (Total 22) | |

Particulars as to the Foregoing Cases.

| | |
|---|---|
| Pyrexia (temp. 102° to 104°) | 8 |
| Hyperpyrexia (temp. over 104°) | 1 |
| No observations as to temperature | 1 |
| Average temperature of 21 cases | 100·3 |

| | |
|---|---|
| Much prostration | 12 |
| Prostration not severe | — |
| Chiefly on liquid diet | 13 |
| Strictly limited to liquid diet. | |
| Dry diet | 0 |
| Saliva abnormally deficient [1] | 8 |

Died, 14; recovered, 7; relieved, 1.

## Class 9.—The Process by which the Coated, Furred, or Encrusted Tongue becomes Red, Smooth, and Dry.

*Plate III. Nos.* 9 *and* 10.

*Plate IV. No.* 11.

The cleaning of convalescence requires no further notice; the shelving off of the coat at the tip and edges has been described. In less favourable circumstances the process of making bare occurs in this wise. The incrustation is very dry and correspondingly brittle, and the epithelium beneath it, in connection probably with the same want of moisture, does not grow properly. The coat or crust now wears off more or less at the tip and edges, in a gradual manner, and displays not the normal surface, but a red and dry one, usually covered with a delicate membrane, so thin as possibly to escape notice, but discernible to a careful eye. Under the microscope it is evident enough. After, or more or less together with, the exposure of the fore part of the tongue, the central part loses its covering along a broad stripe which reaches from this point not quite to the back. This may be an inch or rather more in width, and is the part of the tongue most exposed to the breath, and consequently the driest. The clear-

[1] The extreme illness of many of these patients made it difficult to estimate the absence of saliva by attempts to spit or by catheterisation of the duct. The number therefore appears small. It is probable that saliva was wanting in nearly all, so far as the state of the mouth could be taken as an index.

ing is often effected by a very obvious cracking and breaking away of the crust, which may be so rapid that I have seen a much-encrusted tongue become nearly naked in a day. The exposed surface may look raw, but is seldom absolutely so, for it is skinned over with the dry translucent membrane which has been described. This stretches straight along the surface, like the arachnoid of the brain, not dipping between the papillæ, the outlines of which it obscures. The bare and polished stripe is often fringed with white fur or coating as a line down each side, outside which is the nearly normal lateral margin. After a time the whole upper surface becomes nearly equally red, dry, and bare, the surface being intersected with fine or deeper lines or cracks, some longitudinal, the deeper transverse. The coating is retained longest at the root. A resumption of moisture is a sign of constitutional improvement, and precedes a gradual reclothing—too seldom observed—which restores the tongue to its normal state.

I will now bring the microscope to bear upon the process which has been described. I pass over the gradual change of convalescence to consider the modes by which the morbidly dirty tongue becomes morbidly clean. Starting with the elongated papillæ of the furred tongue, these, together with all the superficial epithelium, are often swept off accurately down to the Malpighian layer, which retains its place, and still uniformly clothes the corium. In time, or almost simultaneously, this may become covered afresh with epithelium of the horny sort, not at first as in health, but in the shape of the thin membrane of which I have spoken. Supposing the denuding process to continue, the Malpighian layer itself is removed and the corium exposed, making a surface which is uneven microscopically, though to the naked eye smooth, and necessarily red and raw. This process is attended with vascular injection, hypernucleation, and often the extrusion of leucocytes. Much of the injection and hypernucleation may

be the consequence of the loss of the protective epithelium, with exposure and irritation of parts which should be covered. But in some cases it is apparent that a general inflammatory infiltration of the superficial parts precedes the denudation, and helps to produce it by a destructive process. This is most marked with scarlatina, where the infiltration is often most abundant. This may be due to the especial effect of the disease, which the tongue appears to share with the skin and throat. I have now traced the flaying operation down to the true skin. All that is special to the tongue has gone, at least in places; but more often, as I have said, the process stops on reaching the Malpighian layer, and here begins a process of repair to which I have alluded, but to which I must revert. The tongue is now red, level, and polished. To the hasty eye it looks like raw beef—a similitude often used; but the beef is wrapped in silver paper. A continuous layer of horny epithelium of extreme tenuity presents itself, and, resting on the more elevated remnants of what were papillæ, stretches from one to another without dipping into the hollows, like the roadway of a bridge. The hollows, however, are not empty, but contain epithelium of the deeper sort. The somewhat gradual process which I have described is sometimes replaced by one into which violence more obviously enters. This relates especially to the encrusted tongue. The felted mass of crust breaks through its deeper part, the fracture passing through the bases of the papillæ, leaving their broken stumps standing. These quickly become levelled down, and the Malpighian layer soon presents itself with the delicate membrane, as described. In this breaking away of the crust, accident cannot be excluded, but more is probably due to the rising up of new epithelium from beneath, by which the brittle, and mostly effete, mass above is pushed from its stool. Probably something of this sort happens when scarlet fever patients and snakes shed their skin.

It is no part of my purpose to treat of the special diseases of the tongue, but one of them bears instructively on the question before us in presenting a mode by which the coat and the papillæ themselves are removed. Dr. Cavafy gave me the opportunity of examining the tongue after rapid and

X 60

FIG. 3.—Acute œdema of the tongue connected with albuminuria. The papillæ are in process of detachment by the disproportionate swelling of the parts beneath. The exposed part has acquired the level membrane, such as is represented on Plate IV.

great swelling in a condition of glossitis or acute inflammatory œdema, which had come on in the termination of albuminuria. The state was clearly inflammatory, not dropsical. The swollen tongue, which I did not see during life, presented, when examined in section, an extensive region on its upper

surface which was so far denuded that the corium was covered only with a thin straight membrane, such as has been elsewhere described. The membrane in this case, however, was different from what is usually seen in being carried along an uninterrupted surface without having to bridge any depressions or sulci. This appeared to be due to the stretching of

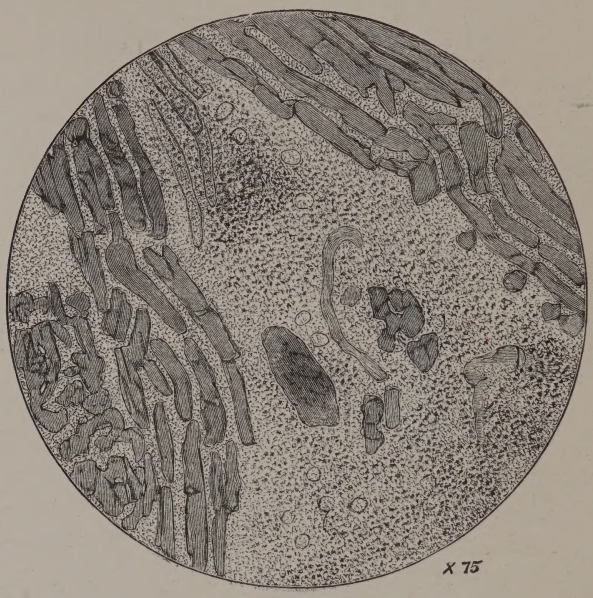



FIG. 4.—Portion of the muscular structure of the same more highly magnified, showing the interstitial exudation which was the chief cause of the swelling.

the surface by swelling, all the notches between the papillæ having been pulled straight and the serrated surface converted by elongation into a level one. At the edges of this level plain were upstanding papillæ, those nearest to the smooth surface showing the process of breakage by which it had become denuded. The surface had apparently been made bare by the detachment of the papillæ in the process of

stretching. How this stretching had been produced was made evident by an examination of the deeper parts of the tongue, where a large granular exudation was irregularly disposed between the muscular fibres. I give sketches showing the levelled surface, the adjoining partially detached papillæ, and the interstitial intrusion to which the swelling was due.

9. Furred or Encrusted, becoming Denuded; generally Dry.

| | |
|---|---|
| Tetanus | 1 |
| Syphilitic mania | 1 |
| Valvular disease | 1 |
| Pneumonia | 4 |
| Cirrhosis | 1 |
| Dysentery, abscess of liver | 1 |
| Cancer of pancreas, &c. | 1 |
| Peritonitis, fæcal extravasation | 1 |
| Typhoid | 1 |
| Pyæmia | 1 |
| (Total | 13) |

Particulars Relating to Preceding Cases.

| | |
|---|---|
| Pyrexia (temp. 102° to 104°) | 5 |
| Hyperpyrexia (over 104°) | 1 |
| No observations as to temperature | 3 |
| Average temperature in 10 cases | 100·8° |
| Much prostration | 7 |
| Prostration not severe | — |
| Chiefly on liquid diet | 9 |
| Strictly limited to liquid diet | 2 |
| No food by mouth (fed by rectum) | 0 |
| Dry diet | 0 |
| Saliva observed as deficient[1] | 2(?) |

Died, 10; recovered, 1; relieved, 1; not relieved, 1.

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[1] Mouth invariably dry, but special observations on saliva not generally made, or practicable.

## Classes 10 and 11.—Bare, Red, and Dry Tongue.

*Plate III. Nos. 9 and 10.*

*Plate IV. No. 11.*

In the description of the process of denudation I have anticipated much that applies to the bare tongue. The completely bare tongue, red, raw, and dry—for this state does not seem to be attained except with dryness—is comparatively rare. The term *completely* bare or denuded relates to the completeness of the loss of the epithelium in certain places, not to its spread over the whole tongue. This change is more limited in extent than the more shallow divestures which have been described. I have already traced the process down to the Malpighian layer, which has become covered anew with a straight membrane instead of the normal serrated one. Should repair be exceptionally wanting, this membrane is not formed, but the Malpighian layer is left to break away and lay bare the corium beneath. Occasionally it would seem that the destruction occurs after the formation of this membrane, which it involves, for the broken ends are often seen overhanging a tract of excoriation. The exposure is effected not quite abruptly; the neighbouring epithelial structures shelve off until the patch of complete exposure is reached. Here no epithelium of any kind remains; the corium is laid bare to the cavity of the mouth, and is even sometimes itself encroached upon. I have not seen this process to descend quite to, though sometimes it has approached, the muscular fibres. The exposed corium sometimes shows little change of structure, more often it is infiltrated with leucocytes, sometimes to such an extent that the surface appears to be entirely composed of them. There is also injection of the blood-vessels. The infiltration is probably generally due to

irritation by the unaccustomed contact of the contents of the mouth, and is subsequent, not antecedent, to the loss of covering. Even in scarlatina, where the inflammatory exudation may possibly be a part of the eruption, the nucleation is greater in the exposed parts than elsewhere.

For clinical purposes I shall place together two classes that cannot be always distinguished except with the microscope, and give a common consideration to the red denuded tongue, whether absolutely bare or protected only by the thin membrane which has been described.

The qualities of redness, smoothness, and dryness are nearly related. If the tongue be uncovered by the opaque superficial epithelium it will necessarily display the vascularity of the deeper parts; and this is usually increased because the tongue is irritated by exposure. The denuded tongue is dry partly because the loss of epithelial protection allows of increased evaporation from its surface, but chiefly from want of saliva. Want of saliva may encrust the tongue; it may also make it bare: of this more anon. This variety of tongue is that on which aphthous growths are most apt to occur.[1] It presents itself in diverse circumstances, generally of exhaustion. The most prominent fact is its occurrence as the result of exhaustive discharges, especially of pus, and it is linked with the constitutional state described as

[1] It is worth remarking that, though aphthæ are noticeable chiefly on the red smooth tongue, upon the otherwise clean surface of which their white forms are conspicuous, yet the special vegetation of which they consist is found in other circumstances, being a constituent of crust, as already shown. Probably the *Oïdium albicans* tends to gather upon an inflamed, ulcerated, or otherwise altered surface rather than a healthy one; and, like other parasitic growths, is apt to present itself in conditions of depression which are also those in which the red, raw tongue is developed. What may be the connections between the *oïdium* and the state of surface which this tongue affords, and what in further detail are the relations of thrush to the general health, are matters upon which I had hoped to have said more, but have not been fortunate in obtaining tongues thus affected. The subject is well worth further attention.

hectic. The Table shows that of thirty cases seven were connected with an ostensible escape of pus, including one case of lumbar abscess, one of empyema, two of discharge of pus with the urine, one of dysentery with open hepatic abscess, and two of advanced phthisis with much expectoration and diarrhœa. Besides these, in which loss of pus was obvious, there was one instance of profuse dysenteric flux in which an abscess had formed in the liver but not found exit; two cases of lardaceous disease with the customary discharges, and five of advanced diabetes, brought to fifteen, of thirty, the number of instances in which this state of tongue was associated with exhausting discharges. The frequency of diarrhœa deserves remark. It has not been shown so far that simple diarrhœa causes it, but diarrhœa was prominent with other morbid conditions, notably dysentery and phthisis. The most striking tongue of this kind which I ever saw (it was as red and almost as smooth as sealing-wax) was in the case already referred to of acute dysentery, with unopened hepatic abscess.

I have to thank Sir Joseph Fayrer for giving me some of his Indian experience, with regard more especially to tropical diarrhœa. In advanced cases of this, the tongue, he says, is shrunken, red, polished, and smooth; the papillæ have disappeared, and the epithelium is stripped off in patches. The gums, lips, and buccal mucous membrane are often aphthous. The tongue is very tender; alcohol and salt cause great pain in passing over it. As significant signs of convalescence, Sir Joseph notices a softening of the tongue, a change of the red to pink, loss of tenderness, and the re-appearance of the papillæ.

There remain cases in which the red, dry, smooth tongue has presented itself without any obvious association with discharge. Among them were five of pneumonia, all with much depression; one was double, and attended with maniacal

delirium; one was complicated with delirium tremens; another was in a drunkard; two were attended with great prostration (not explained). There were two cases of typhoid, of which one was characterised by sleeplessness and nervous agitation; one of tubercular peritonitis, one of biliary colic, and one of a dangerous gorge of grapes,—all these conditions being attended with much depression. Advanced tubercular disease presents itself as a not infrequent associate of this tongue; there were five cases of this sort in the thirty. Pyrexia is not needful, though often present. A temperature not above normal was found with it in cases of lumbar abscess, pyelitis, lardaceous disease, several of diabetes, and some under dry diet. As compared with the encrusted tongue, there is no great difference in the frequency of pyrexia; both may occur without it; the average temperature of the bare tongue is somewhat lower than that of the encrusted.

To sum up the circumstances of the red, smooth, dry tongue, they are usually more chronic than those of the encrusted. This must be so, since the one is often a later stage of the other. Exhaustion by discharge is frequent with the smooth tongue; or, if this be absent, there are generally especial circumstances of prostration or depression, which are often connected with the abdominal organs. This tongue implies failing nutrition. The clinical evidence accords with the indications of pathology in this respect. The saliva is, I believe, always deficient, though I think it is not usually so completely absent as with the encrusted tongue. It will presently appear that in certain circumstances want of saliva prevents the growth of epithelium; though this failure of growth may also have its connection with a more general impairment of the nutritive process. Increased moisture of the tongue is a sign of the best omen; this is usually followed by re-covering, and possibly by recovery.

The frequency of the red, smooth, or raw-beef tongue in connection with dysentery, especially where abscess of the liver is also present, and with other affections of the alimentary canal, cannot but attract especial notice, and has been attributed to reflex nervous influence. This cannot be absolutely negatived, yet we may hesitate to introduce such an explanation in the presence of other circumstances, which certainly go far to account for the state of tongue. The chief of these are the prostration common in the disorder mentioned, presumably impairing the epithelial growth, together with the want of saliva, which contributes to the same deficiency, and the irritation of the unprotected surface by the contents of the mouth.

The prognosis with this tongue is bad: of the thirty cases in which it was recorded, sixteen ended fatally. The mind commonly remains clear, though the patient may be weak unto death.

10 and 11. Bare, Smooth, Dry, Red (Membrane or None Evident.)

| | |
|---|---|
| Pneumonia | 5 |
| Broncho-pneumonia (also after recovery) | 1 |
| Phthisis or general tuberculosis, or of peritoneum | 4 |
| Hepatic ascites and dry diet | 2 |
| Attack of gall-stones | 1 |
| Lardaceous disease, ascites, &c. | 2 |
| Dysentery and abscess of liver | 2 |
| Surfeit | 1 |
| Diabetes, advanced | 5 |
| Typhoid | 2 |
| Pyæmia | 1 |
| Lumbar abscess, discharging | 1 |
| Pus in urine (abdominal tumour) | 1 |
| Tubercular pyelitis, pus in urine | 1 |
| Empyema, discharging | 1 |
| (Total | 30) |

Particulars Relating to the above Cases.

| | |
|---|---|
| Pyrexia (temp. 102° to 104°) | 11 |
| Hyperpyrexia (temp. over 104°) | 2 |
| No observations as to temperature | 1 |

| | |
|---|---|
| Average temperature in 29 cases | 99·6° |
| Much prostration | 21 |
| Prostration not severe | 2 |
| Chiefly on liquid diet | 11 |
| Strictly limited to liquid diet | 6 |
| Dry diet | 2 |
| Saliva abnormally deficient | 15 |

Died, 16; recovered, 6; relieved, 7; not relieved, 1.

## Class 12.—Cyanosis or Venous Congestion of the Tongue.

(*See Plate IV. No.* 12.)

This tongue is characterised mainly by a superabundance of recent or deep epithelium which occurs in circumstances indicative of excessive production, not deficient removal. It especially belongs to heart-disease or cyanosis from some other cause. To the naked eye there is a bluish or purple colour, and a smooth, wet, slippery surface like that of an eel, upon which the papillæ are almost indistinguishable, as if fused together or in some other way deprived of their separating intervals. Upon this substratum may be overlaid more or less of one of the grades of coat which has been described, to the partial obscuring of the deeper characters. Microscopically, the most noticeable peculiarities are superabundance of the recent epithelium, vascular injection, and hypernucleation. The deep epithelium is amassed thickly over the surface, sometimes rising to the tops of the papillæ, but leaving these exposed, sometimes overlaying them completely, so that the whole papillary structure is embedded. The Malpighian layer shares in the overgrowth. The horny epithelium is usually deficient, as also are superficial vegetations, so that the surface is often abnormally clean and smooth. The corium and deeper parts are enormously over-injected and over-nucleated, and the fibrous tissue of the

corium is often coarse and hypertrophied. The appearances presented suggest the means by which they are produced. In the excess of deep epithelium and of nucleation we see evidence of increased growth, while the generally clean surface shows that wear is not wanting. The essential factor is a hypertrophic process connected with mechanical congestion.

The thick covering of the tongue with epithelium of the deep character is not confined to heart-disease or cyanosis. My classification was based on what can be surely recognised with the naked eye. Had microscopic examination been the criterion, a separate class must have been made, characterised by excess of epithelium of this sort. (See last figure on Plate IV.) But this peculiarity is not obvious. The horny or superficial epithelium when wet is white and conspicuous; the deep epithelium is neither. Its presence in excess may be inferred from the appearance of cyanosis, and guessed at from some degree of paleness and fulness. In a case of chronic albuminuria, where I had reason to think that this condition existed, though happily there was no opportunity of post-mortem verification, the tongue was remarkable chiefly for its pale colour and enlarged papillæ. The pallor was such as to suggest anæmia, a state which affected other parts as well. The tongue was nearly clean, so that the papillæ were seen to advantage. Both filiform and fungiform were exaggerated in size, as could be seen with the naked eye and made more clear with a lens. The filiform looked fleshy and substantial. The absence of injection in the enlarged fungiform was in striking contrast with what is seen in other circumstances. Such a tongue may be thickly covered with superficial epithelium, by which the deeper characters may be hidden. Taking as the standard great excess of deep epithelium as displayed after death by the microscope, I find that of nineteen cases four were connected with cyanosis (cardiac or

pulmonary), six with chronic albuminuria, two with acute tuberculosis, two with pyæmia, and one with each of the following—pneumonia, diphtheria, perityphlitis, lumbar abscess, and leucocythæmia. Thus we see this form of epithelial hypertrophy in circumstances of three kinds—venous congestion, albuminuria, and diseases attended with pyrexia. To take the last first, no details of temperature are needed when once the disorders have been named. The overgrowth was no doubt a direct result of the increase of body heat on principles which have been stated. No further reference need be made to the congestion of cyanosis. But I must halt for a moment upon the question of albuminuria. I have sections of eight tongues from cases of chronic renal disease, mostly the granular kidney; in six there was such accumulation as has been described; in two there was less, but enough to show the tendency. Why in these cases should the epithelium grow in such profusion? Not from pyrexia, for there usually was none; not from venous congestion, of which there was generally no sign. Was the hypertrophic process due to the increased arterial tension so constant in the circumstances? If this be so, we should find hypertrophy of epithelium elsewhere. The reason may admit of doubt; but I think none need apply to the observation that in chronic albuminuria certain parts of the lingual epithelium are remarkably increased.

### Pityriasis Linguæ, or Annulus Migrans.

There is a curious affection which has been called ringworm of the tongue, pityriasis linguæ, lichenoid, and annulus migrans. This is rare and incompletely understood. It must be considered as special to the tongue, for we know of nothing exactly like it elsewhere; but it is as yet uncertain whether it has its source in this organ or, as is perhaps more probable,

is a manifestation of a disturbance arising somewhere else. It may not be properly included within my design, which is to deal with the symptomatic changes, but neither can it with confidence be excluded. I will therefore insert a word or two about it if only by way of note or parenthesis, more especially as I have had what I believe is a novel experience —the opportunity of post-mortem examination.

The tongue in this condition presents remarkable circles, or curves which may form parts of circles or be more or less irregular, with a general tendency to re-enter and enclose a space. Each circle or curve consists of a narrow white line of coating, while the central district is less coated or bare. The circles may be compared with tinea tonsurans, or 'fairy rings' on turf, though with the incomplete curves the resemblance to either is less exact.

These patches, which are abruptly separated from the surrounding surface, which may be natural or nearly so, are often placed on the lateral portions of the tongue, though by no means always confined to them; more often than not they affect both sides, and that sometimes with exact symmetry, sometimes with an approach to it. Occasionally, as in the woodcuts, the eruption is displayed on the under as well as the upper surface. The patches begin in the centre and spread centrifugally, the white circumference marking the part last affected: the mode of progress cannot but suggest the advance of a fungus from a centre—a botanical hypothesis which, as will be seen, is not borne out by further examination. Scrapings of the surface during life display only what is found in most coated tongues—micrococci, filaments of oïdium and bacteria; but no special organism has come within my observation or been confidently described by others. Mr. Barker once found some cryptogamic structures resembling the trichophyton, but these were met with on one occasion only of many, and were thought to be accidental.

The variety of organisms proper to the coat of the tongue must necessarily make it difficult to detect another; but not only has this not been done, but the general morbid anatomy of the change is not consistent with a parasitic origin. The

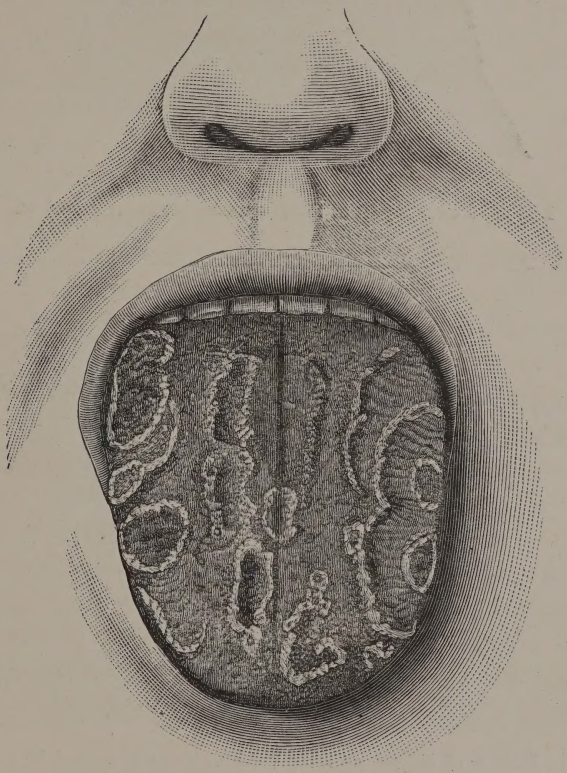

FIG. 5.—Pityriasis linguæ or annulus migrans, from patient referred to on page 84. Upper surface of the tongue.

sections I have examined from the case I have alluded to show that there are alterations below the surface with which superficial parasites obviously have nothing to do.

The outer ring of coat presents long papillæ which are

tipped with horny epithelium, and often surmounted with the vegetation common to the coating of the tongue. The central bare part displays papillæ which have become

Fig. 6.—Lower aspect of the tongue from the same patient.

X 60

Fig. 7.—Section of tongue showing the eruption represented in preceding woodcuts. The white circumference shows an abundance of superficial epithelium. The whole section displays a profuse cellular formation in the corium, most abundantly in the bare central part of the affected patch. From a preparation made by Dr. Delépine.

denuded generally down to the Malpighian layer, so that all the superficial epithelium has gone. The Malpighian layer, or at least its deepest part, remains, though not unaltered, for

the cells of which it consists are elongated as if overgrown. Below this layer in the corium are much vascular injection and abnormal profusion of leucocytes. These are collected in great abundance along the margins of the injected vessels, in the superficial parts of the corium and within the central columns of the papillæ which are in continuation with this portion of the skin. The extruded cells are in the greatest profusion in the central or enclosed part of the eruptive patch, where the papillæ have lost their covering and the surface of the tongue is bare. Outside, in the surrounding ring, where the papillæ are fully, and even excessively clothed, the extrusion or cell-formation is less, but is present and is similarly disposed. The Malpighian layer shows general overgrowth, especially on the papillæ, where the appearances suggest that this sprouting from below was the means of lifting and displacing the epithelium above, and so detaching the horny portion, the absence of which made the central region bare.

Thus the change appears to belong essentially to the corium, not to the exposed surface ; to originate in the blood-vessels rather than in the epithelium, the changes in which are secondary to those beneath. The visible part of the disease appears to be one or more rapidly expanding foci of inflammation, or at least of injection and extrusion, which begin in the sub-epithelial part of the skin and carry superficial changes in their wake. The appearances when looked at minutely are more suggestive of some passing disturbance belonging to the blood-vessels than of a parasite, of which the nidus would presumably be in the epithelium. The bilateral symmetry, which is occasionally exact, is suggestive of a constitutional origin rather than a local one.

The eruption is extremely evanescent, changing from day to day. It affects the same person repeatedly. The woodcut represents an attack which was believed to be the eleventh

The clinical relations have as yet thrown but little light upon its nature. Of three cases I have seen, the subject of one, that from which the drawing was taken, was a woman, thirty-five years of age, under the care of Dr. Whipham, who died of valvular disease of the heart of rheumatic origin. The subject of another was an anæmic little girl, four years old, who was liable to asthma. The third patient was a neurotic gentleman, approaching the age of sixty, who was the subject of arthritic pains, which were regarded as rheumatic, but which may have been gouty.

The pathological nature of the change shows that the blood-vessels are its immediate source, whatever may be behind to determine their action. Embolism at once suggests itself, as soon to be discarded. The lingual arteries arise from separate carotids, and these from different parts of the greater channels. It is improbable that the two linguals should often be similarly and at the same time penetrated by clots from a distance, and impossible that they should habitually be so. Putting embolism aside, we may next appeal to the bilateral symmetry in evidence that the change is not the result of a local irritant; thus a diseased tooth, or what not, could scarcely be supposed to act so regularly and equally on both sides as must the cause of this eruption. Looking for general or remote causes, the circumstances are more suggestive of one acting through the blood than through the nerves. Blood disorders, the exanthemata, gout, rheumatism, and syphilis, continually affect both sides similarly; and though there are instances of central nervous disorders—locomotor ataxy for example—affecting the skin and tissues on both sides alike, yet many complaints of nervous origin, such as several forms of herpes, present themselves on one side only. It is clear that if this peculiar disease of the tongue originates in the nervous system it must be in some central part, but it seems more likely that it may have to do with the state of the

blood or be akin to the disorders which are thought to have their chief concern with it. It is too soon to push this speculation into detail. Syphilis appears to be clearly excluded. Mr. Barker has referred to eleven cases of the kind—six in females, five in males, while of nine the subjects were under twenty years of age.[1] The absence of male preponderance and the incidence as regards age makes gout less probable than rheumatism. Of the three cases I have had under observation, one was associated with rheumatic disease of the heart, and another with a liability of which the nature as between gout and rheumatism was doubtful. Further experience is needed before more can be said.

I have now concluded the separate consideration of each variety of tongue. I shall proceed to make a few observations relating to some general conditions which belong to it or affect it, and while I do so, I must ask the College to tolerate a certain amount of repetition which it will not be possible to avoid.

Having regard to the importance of *dryness* as necessary to some of the most significant alterations of the tongue and its value *per se* as a clinical indication, I shall take this quality into consideration, abstracted, as far as may be, from others. Before doing so I shall venture to delay the College with a few observations upon the saliva.

## On the Saliva.

I am satisfied that of all the immediate causes which make the tongue dry, or tend to do so, arrest in the secretion of saliva is the most important. In advanced conditions of dryness, not only is saliva obviously absent from the tongue and mouth, but the patient cannot spit. When the dryness is less complete he will sometimes produce with difficulty

[1] 'System of Surgery,' by Holmes and Hulke, 3rd edit., vol. ii. p. 560.

a little spittle, which is often tenacious or bloodstained. Frequently in the absence of saliva such patients will, on the request to produce it, hawk up a little mucus from the throat, which is clearly a different thing. I have made many experiments upon the salivary ducts, or rather, I should say, upon those of the parotid, which lend themselves most readily to the purpose. A tube passed into one of these channels in health could generally be made to drip saliva somewhat abundantly by the application of acetic acid to the tongue, or the secretion could be seen working its way out by the side of the tube. When the tongue was dry it was usually impossible to obtain any by such means. With advanced and complete dryness I have never been able to get a drop; with lesser degrees often a little. These observations show the dryness to be, as a rule, due to deficient secretion of saliva, not to its drying on the tongue, as has been supposed by some. This failure of secretion appears to be of much significance. It is not possible thus to gauge any other of the secretions which are concerned in the digestive process; but it is, at least, probable that the gastric and others may be similarly affected. It is a matter of immemorial experience that the dry tongue, more particularly that which is also encrusted, is incompatible with the digestion of solid food; the physician orders liquids and stimulants. This ancient practice has been arrived at not by reasoning but by a less unsafe though a longer road—experience. We may be sure that there is natural truth at its foundation, though we may not know what that truth is. Provisionally we may assume that a deficiency of saliva, if it depend on other than local causes, goes with a deficiency of other juices concerned in digestion. At the same time it would seem that other secretions—those, for example, of the kidneys, the intestines, and the skin—do not take part in any failure of secretion which may be supposed to exist. Putting aside cases

where an excess of some secretion, as with diarrhœa or diabetes, has been contributory to the dryness, there are many of daily experience where together with a dry tongue the urine is fairly abundant, the bowels free, and the secretion of the skin not wanting or even excessive. If, therefore, it be presumed that the failure of the salivary secretion is associated with a similar failure elsewhere, it is clear that the arrest is limited, not common to all the glands of the body.

I may add a few words upon the action of saliva upon the coat of the tongue; we have seen that, as a general rule, as the tongue becomes more and more coated, especially with acute disease, it gets drier and drier. This association of want of saliva with increasing coat suggests the question whether the secretion has any solvent action on the coat, so that this thickens from the absence of normal solution. This must be answered in the negative. I have taken coated tongues and kept similar pieces of them, one in saliva and one in water, for periods ranging up to sixty-eight hours. Then, making sections of each in the usual way, I have satisfied myself that there was no greater loss of epithelium in saliva than in water, and the same result has been given when the experiment was conducted at a temperature of 100° as at the ordinary temperature of a room. Whatever effect, therefore, is to be attributed to want of saliva, it is not by loss of any solvent action.

Other causes have been shown to conspire to make the tongue coated, but it would seem that want of saliva by itself will do this. A boy was brought under the care of my colleague, Mr. Rouse, with, as was believed, a fracture of the base of the skull. He had left facial paralysis, and an injury apparently of the chorda tympani on this side. The tongue was normally protruded, but the left half, sharply defined by the median line, was dry, and presented a milky appearance. The suppression of saliva was probably the

cause of the coat, though other effects of nerve-injury could not in this case be absolutely excluded.[1] I will take a simpler case reported by Mr. St. Clair Buxton. A lady had mumps, after which her mouth became quite dry. The tongue, gums, cheeks, palate, and pharynx presented a 'fearfully dried up state.' The tongue was thickly coated with a tough brown fur, which was horn-like and so hard that it sounded under a blow like the cover of a book. After ineffectual treatment by other means, the salivary ducts were probed, the glands galvanised, and the secretion restored. In the course of the following day, Mr. Buxton tells me, in a letter for which I have to thank him, the fur became soft and spongy, though it had previously been as hard and dry as wood; in a week all had cleared off, and in a fortnight or three weeks the tongue was perfectly normal. The fur stripped off in patches, leaving a rather raw surface underneath, which gradually assumed a natural appearance. It has been shown how closely the conditions of furring and incrustation are associated with deficiency of saliva, and inferred that these are largely the physical results of the ensuing dryness; the normally wet surface is soft and liable to wear; deprive it of moisture, and it becomes horny and resistant of it; besides which, with no saliva solid food is unacceptable. So that while induration is created attrition is reduced; and in general terms, and up to a certain point, it holds good that the less saliva the more coat.

But there is another relation between the secretion and the covering, and that of an opposite kind. An interesting case of lasting suppression of saliva was published by Mr. Rowlands of Great Crosby,[2] and I have to thank him for further particulars by letter. Ten years before the date of the report, a lady of the age of sixty underwent sudden and

[1] For this observation I have to thank Mr. Peel Davies, then house surgeon.

[2] *The Lancet*, vol. i. 1888.

complete suppression of the saliva, after a nervous shock. Since this the mouth and tongue have been perfectly dry. The tongue now presents the appearance of a piece of dry raw beef; it is perfectly clean and intersected with superficial fissures; no papillæ are to be seen with the naked eye, though to be made out with a lens. Here is a typical red, dry, smooth tongue sequent, and probably consequent, upon simple deficiency of saliva. It is scarcely necessary to revert to the red smooth tongue of disease, of which deficiency of saliva has been shown to be a constant, if not a necessary, attendant. These experiences showing coating and denudation from the same cause are not so contrary as at first sight appears, for many smooth tongues were formerly rough. The difference is largely one of time: furring and incrustation are early results of want of saliva, denudation a late result. It has been shown that with the bare tongue of constitutional disease two agents are commonly present—want of saliva and failure of general nutrition; but that want of saliva by itself is able to cause bareness is shown by such cases as that reported by Mr. Rowlands. Of the *modus operandi* I was long in doubt. The epithelium is fed by the blood, not by the saliva. Why does it waste in the absence of the non-nutritive fluid? Conversation with my colleague, Mr. Bennett, has, I think, given the clue. The epithelium, though not nourished by the saliva, needs to be kept moist by it, otherwise it cannot assimilate what is provided by the blood. Be this as it may, a general law may be formulated: the tongue tends to become smooth whenever for a long time it is kept dry.

## LECTURE III.

### Dryness.

Mr. President and Gentlemen,—I now come to the consideration of dryness of the tongue and its causes. A glance at the annexed Table will suffice to show how largely this depends on constitutional and how little on local circumstances.

Concomitants of Dryness of the Tongue.

| | Cases. |
|---|---|
| Tongue dry, irrespective of other qualities | 113 |
| Pyrexia (temperature 102° or over) | 37 |
| Temperature not above normal | 39 |
| Discharge by simple diarrhœa or dysentery | 6 |
| Discharge, diarrhœal or other, connected with lardaceous disease | 2 |
| Diarrhœa in connection with other forms of organic disease—phthisis, cirrhosis, &c. | 9 |
| Chyluria | 1 |
| Discharge by suppuration | 8 |
| Serous discharge by frequent tapping of pleura | 1 |
| Diabetes (including 3 of diabetic coma) | 8 |
| Dry diet | 6 |
| Coma or unconsciousness, with general openness of mouth | 14 |
| Openness of mouth from obstruction of nose, tonsillitis, or other causes unconnected with coma | 6 (?) |
| Great prostration or exhaustion | 51 |
| Cases ending fatally | 56 |

The old physicians recognised dryness of the tongue as of evil omen. Hippocrates refers more than once to this as a bad sign. The great Willis speaks of the dry tongue in certain cases of fever, and refers it to constitutional causes,

as expressed in the fanciful language of his time. 'The nervous juice,' he says, 'is thoroughly roasted by a long concoction, and so becomes almost like glue, thick; wherefore not being able to be dispersed neither by spittle nor by insensible transpiration, nor to be separated by the urinary passages, at length leisurely runs out by the passages of the spittle, and forthwith by reason of its thickness grows into that glueiness.' I think most physicians at the present time regard the dry tongue as a constitutional symptom, and as a bad one, notwithstanding that there are some who have sought to refer it rather to local conditions than to the system at large. My cases, collected without special selection, show with the dry tongue, be its origin what it may, a startling mortality—one of almost exactly fifty per cent. Of 113 patients with dry tongues, fifty-six died.

I will now come to the causes in detail. The immediate causes are two: increased evaporation from the mouth; diminished secretion into it.

1. *Increased evaporation* may be due to exposure of the mouth by persistent openness; as when the nose is obstructed, and when coma exists; or to increased heat of body, and as a consequence of expired air. Further, there is a double relation between dryness and bareness: dryness has been seen to cause bareness; but must not bareness at least help to cause dryness? Epithelium is conservative of moisture, as may be witnessed in any dissecting-room; wherever the surface of the skin has been rubbed off the deeper part dries and cornifies. Thus if by chance the upper epithelium of the tongue should be lost, the deeper investments must be more amenable to evaporation and desiccation.

2. *Diminished secretion* may be either of the salivary or the mucous glands; but the moisture of the tongue depends more upon the salivary secretion, which is abundant and watery, than upon the mucus, which is scanty and thick.

From the immediate conditions which determine dryness of the tongue I now approach the more complicated morbid circumstances which lie behind them. First, I will take conditions which entail persistent openness of the mouth, and so increased evaporation. Secondly, states of pyrexia, of which the bearing is more complex, but which involve increased evaporation from the tongue by reason of the heat of the expired air, and also general dehydration and consequent diminution of saliva from the generally increased evaporation which the heat of the whole body entails. Thirdly, profuse discharges which consist largely of water, by which the body is dehydrated and the salivary glands in particular stinted of their proper material. Fourthly, conditions of prostration or exhaustion, which states are adequate in themselves to suppress the saliva and dry the tongue, though often they are assisted by other causes, more especially discharges and pyrexia.

*Habitual openness of the mouth.*—Much importance—I think I can show too much—has been attached to this either as occurring during sleep, or from obstruction of the nasal passages, or from coma. If the tongue be persistently and generally dry, I believe that other causes are always at work. I have known the tongue to remain perfectly moist while the nostrils were, and had been for some days, plugged for epistaxis. On the other hand, it is common to find a path of dryness down the centre of the tongue, corresponding to the exposure to breath in tonsillitis and other throat affections. With regard to the chronic enlarged tonsils of childhood, when the child sleeps with the mouth open, I am assured by my colleague Mr. Bennett, who has removed many of these, and always does it early in the morning, that on waking the tongue is usually dry, but afterwards soon becomes moist. Certainly such tongues are usually moist when they come under my notice. If the tongue is persistently

dry from enlarged tonsils, I think the affection is usually inflammatory, so that causes other than exposure assist. In the earlier part of this inquiry it was my rule to examine into the course of the breath whenever I found the tongue to be dry; but the conviction was forced upon me that the state was generally due to other than mechanical causes, and I ceased to look for this one with the attention I had before given to it. My figures are therefore less reliable than the general impression which I record. In the great proportion of cases where the mouth is habitually open, it is either from coma or some illness which interferes with full and alert consciousness; the relaxed jaw and gaping mouth are but signs of ebbing vitality, of which the failure of secretion is also a part. I have sometimes ascertained by catheterisation, what was obvious without, that the tongue in such cases is dry, not because normally abundant saliva has dried upon it, but because the secretion has been wanting. In cases where the tongue is dry and the mouth open, other circumstances generally concur in causing the condition: as in a case of tonsillitis with a temperature of 103°; one of acute rheumatism with a temperature of 101·5°; one of suppression of urine with profuse diarrhœa; and I might add others. But I need not dwell further upon a cause of dryness which, though it has a place, has not an important one; nor does it obscure to any considerable extent the great constitutional significance of the sign in question.

*Pyrexia.*—To take this next, dryness of the tongue is so frequent with it that the two must be connected; at the same time, the occurrence of the dryness with little or no pyrexia shows that other causes may produce it. As the temperature of the body rises the moisture of the tongue diminishes; on the other hand, it by no means follows that if the tongue be dry the temperature is, or has recently been, raised. Many causes intervene which complicate the relation

between heat of body and dryness of tongue. With typhoid or acute rheumatism the tongue is apt to be dry at a temperature under which, with pneumonia, it would probably not be so. Something is due to time; the more chronic disease is the more drying. A temperature of 102° has little effect in drying the tongue. Even much higher temperatures are reached without the tongue becoming dry, though its moisture is lessened. I have noted many instances of acute disease where the plastered tongue has retained enough moisture to forbid its being called dry under temperatures of from 103° to 104°. It would appear that over 104° dryness is general; over 105° nearly constant. The extent to which other causes intervene is shown by the annexed statement, showing the maximum temperatures in 103 cases of dry tongue.

| | | | | |
|---|---|---|---|---|
| Temperatures | subnormal | in | . . . . | 16 |
| „ | ranging up to | normal | in . . . | 19 |
| „ | „ „ | 100° | „ . . . | 16 |
| „ | „ „ | 102° | „ . . . | 28 |
| „ | „ „ | 103° | „ . . . | 15 |
| „ | „ „ | 104° | „ . . . | 5 |
| „ | „ „ | 105° | „ . . . | 3 |
| „ | „ over | 105° | „ . . . | 1 |
| | (Total | . . . | . 103) | |

In a third of the number the temperature was not over normal; in half it was not over 100. There is no variety of dry tongue which gives so high a mean temperature as the moist plastered tongue of acute disease. It is clear, then, that though pyrexia is a drying agent, yet there are others which are important.

*General dehydration.*—Next, as a cause of dryness of the tongue, I come to general dehydration of the body, whether by deprivation of drink or excessive aqueous discharges. Apart from complications, we presumably have to do not with increased evaporation from the mouth, but with diminution of the saliva, often as a simple and direct result.

First, as to deprivation of water. I have never seen this carried to extremity, nor can I adopt as my own the experience of 'The Ancient Mariner':

> And every tongue through utter drought
> Was withered at the root;
> We could not speak no more than if
> We had been choked with soot.

But of lesser degrees of deprivation, mostly in the treatment of aneurysm and some forms of dropsy, I have recorded eleven instances, in six of which the tongue became dry. I need say no more of these cases now than that they show the results of dehydration in its simplest form; diminution of saliva and dryness of the tongue, with sometimes furring, sometimes more or less denudation.

As a mode of dehydration less simple but more definitely morbid I may next refer to diarrhœa. Of the 113 cases of dryness this flux, simple or complicated, was present in seventeen. I here exclude typhoid. Six were cases of simple or dysenteric diarrhœa; the rest were associated with phthisis, cirrhosis of the liver, lardaceous or other organic diseases, which it would serve no purpose to recapitulate. In six the temperature was 102° or over; in five not above normal. In the larger number the complications were such that it was impossible to assign the state of tongue to the diarrhœa only; but there were three which served to exemplify the dryness as a direct result of diarrhœa, without either organic disease or marked pyrexia; in one of these the temperature was subnormal. More often when this appearance presents itself under the flux some other condition is present, often organic disease, the fatal end of which is not far off.

The maintenance of the moisture of the tongue under diarrhœa, profuse even to death, is a matter of common experience in Asiatic cholera. The tongue here remains moist, creamy, and noticeably cold during the whole of the

purging or algide stage. When the discharges have ceased and reaction and fever set in, then as the pulse rises the tongue[1] begins to dry and becomes quite dry and brown, as often in typhoid, the edges and the tip being red. Probably the persistent moisture of the algide tongue is in some measure due to the watery vomit which so abundantly flows over it; but something must also be attributed to its low temperature. It is a matter of experience that a tongue which is in itself dry is not easily kept otherwise by external wetting. The patient may drink often to this end, but only with a superficial and evanescent effect.

Excessive discharges of urine may be next considered. Diabetes mellitus is a cause of extreme dryness of the tongue; of the 113 cases where this state of tongue was recorded, eight were of this disease. When the tongue has been dry under a mixed diet it will often become moist under a restricted one. By restriction both the sugar and the water of the urine are lessened; the formation of sugar is checked, and with this the discharge of water. Whether the presence of sugar in the blood or the discharge of water takes the chief part in drying the tongue may be ascertained by a comparison with diabetes insipidus, where the loss of water occurs without the production of sugar. I have notes of eight cases of this kind, in most of which the discharge of water was greater than with diabetes mellitus. The tongue was recorded as moist, generally slightly coated, in six; in one as 'cleaning'; in another as 'dryish, pale, and flabby.' The desiccation was therefore decidedly less with diabetes insipidus than with diabetes mellitus, and in the latter disorder must therefore be attributed to some other cause than the simple loss of water by the kidneys. I may mention a

[1] In this description of the tongue in cholera I have been enabled to supplement my own recollections by the more extensive experience of Surgeon-General Cornish.

case which bears on this point. A woman had profuse diabetes insipidus, passing on an average a pint of urine an hour for the twenty-four hours, and drinking to almost exactly the same amount. The tongue remained moist, slightly coated, scarcely unnatural, except that it displayed a syphilitic scar. Three years afterwards I saw the patient again, having lost sight of her in the interval. A very unusual change had taken place; the diabetes had altered from *insipidus* to *mellitus*; the urine was now loaded with sugar and in exactly half the quantity, the amount of drink having fallen in the same proportion. The tongue was now dryish, reddish, and a little brown. The temperature of the body was subnormal. The patient was on the verge of diabetic coma, in which she shortly died. The access of dryness of the tongue with glycosuria, though the diuresis was diminished and the temperature not increased, was instructive. The osmotic action of the sugar in the blood is probably the chief cause of the dryness of the tongue in the circumstances, as it has been shown to be of the dehydration of the lens and consequent cataract. The proximate cause of the dryness of the tongue is absence of saliva, as is evident by the state of the mouth and of the parotid.

*Prostration.*—In speaking of the several varieties of dry tongue, I have shown how much fatal disease they present—altogether about fifty per cent. A dry tongue, more than any other, foretells the ending of mortality. The kinds of disease which it accompanies are chronic more than acute; if febrile, usually continued. Putting aside designed restriction in drink, and also diabetes, where the dryness is due to special circumstances, one is at once struck with the gravity of the cases and the large proportion of these which end fatally. The conditions are most various; it is not easy to see what they have in common, except it be something which may be indicated by such terms as *prostration* and *exhaustion*.

Exhaustion by suppuration of many sources, advanced phthisis and tuberculosis of other kinds, are frequent when the tongue is dry and smooth. When it is dry and rough, the tables show concluding brain disease, concluding cirrhosis, advanced cancer, advanced pyæmia, and severe pneumonia. Of twelve cases of pneumonia in which the tongue was dry seven ended fatally; of twenty-seven in which the tongue was moist only five ended fatally. A dry tongue in rheumatic fever is commonly recognised as an unfavourable omen, though not necessarily a fatal one. In typhoid the converse may be stated—a persistently moist tongue is indicative of a mild attack.

I have used the term *prostration* as a somewhat inclusive one—one which can be better understood than defined,—representing great failure of strength and nutrition, however brought about. With the 113 cases of dry tongue, this condition was noted in fifty-one; in 222 cases where the tongue was moist, it was noted in but twenty-four. We cannot but conclude that prostration or failure of vital force is the most important factor of the dry tongue; pyrexia takes the second place. Clinical experience warrants the assertion that, though dryness of the tongue may occur without great prostration, great prostration is never long continued without dryness of the tongue. Great prostration occurs with little alteration of the tongue in connection with abdominal collapse, as in acute obstruction and perforation, but the condition has not been of long continuance.

Besides prostration—or, be it rather said, together with it—coma presents itself in connection with lingual dryness; this is not wholly due in the circumstances to the open mouth, as I have already shown, but to deficient secretion of saliva. It is to this that the dryness of the tongue is usually due, and it is because the dryness is an index of

this deficiency that it has the clinical importance which, I think I have shown, must be attributed to it.

### On the Influence of Food upon the Tongue.

In considering the causes of the several states of tongue, more particularly of dryness, I have said much which I need not repeat as to various influences which bear upon it. But there are still one or two which demand separate consideration, however brief.

First comes the question of food. The act of eating undoubtedly has an effect in cleaning the tongue, which is mechanical; and coating has been thought to depend, more largely than upon any other circumstance, upon the absence of the attrition which this process entails. It has been shown that the tongue is commonly more coated before food than after, that it is apt to be coated on the side of a tender tooth where mastication is limited, while it remains clean on the sound side where it is not; and much of the effect of acute disease in coating the tongue has been ascribed to the attendant loss of appetite and restriction of diet. But I have already shown that coating is a matter not only of want of wear, but in part of overgrowth; and that other causes (notably pyrexia) are directly concerned. As regards the influence of food, I have sought instruction in cases where there was absence or limitation of it, apart from pyrexia or other causes which act upon the tongue. I have watched the state of this organ in many cases of stricture of the œsophagus where solid food has been entirely disused, and have before me the notes of five such, and I might add as a sixth a case in which the patient refused food in consequence of cancer of the larynx. The back of the tongue here was covered with long shaggy fur like coarse hair. (See Plate II. 7D.) There was another instance in which the tongue was

furred, but it did not become so, notwithstanding long total absence of solids, until it became dry under extreme prostration and absolute pulselessness. Among the other cases there was no instance (though, in some, solids by the mouth were impracticable and feeding conducted chiefly by the bowel) in which the higher degrees of coat existed. In two the tongue was coated, but not plastered; in one it was partly stippled or dotted, being coated only in the back and central parts; in one it was dotted only. In the last case, slight as the covering was, the difficulty of taking food was such as to call for gastrostomy. This case declared in a manner to which accident gave effect how slight is the coating produced by absence of food, as compared with that due to acute febrile disease; for it chanced that I had at the same time in near proximity some typical cases of the plastered tongue of pneumonia and pyæmia. The difference was graphically displayed; among other points the general spread of the acute coat over the dorsum was contrasted with the tendency of the other to collect at the back and in the median line, leaving much of the tongue nearly free.

Cases of restriction to liquid diet, not as a mechanical but a physiological necessity, are seen daily. The physician knows that no other will 'agree with' the patient; he is guided chiefly by the presence of pyrexia and the state of the tongue; the more coated the tongue, the more liquid the diet; if the tongue be dry, the diet is wholly liquid and alcohol part of it. Here the tongue determines the diet, not the diet the tongue; but not without instruction is the issue. As the acute disease abates, the tongue cleans notwithstanding the limitation; as it cleans, and because it cleans, solids are added and may help the process; but the cleaning comes first. In my table of normal tongues are seven which were so under a strictly liquid diet; on every ground, therefore, it appears clear that, though some influence must be ascribed

to food and mastication in cleaning the tongue, yet these are of secondary importance.

I need not revert to the effects of dry diet, which have been discussed in relation to dryness of the tongue; these are briefly want of saliva; and in some cases furring, in others denudation.

## On Conditions of the Alimentary Canal in relation to the Tongue.

It is a common belief that the tongue is directly indicative of many disturbances of the stomach, bowels, and organs directly connected with digestion; some appear even to be possessed with the fancy that the tongue is but an exposed sample of the alimentary canal, and declares by its changes the existence of similar changes in the hidden parts. With those who do not go thus far the white tongue is taken as a sign of constipation, or that the stomach or the liver is out of order, and that alteratives, especially of the mercurial kind, are needed. It is not easy to disentangle the complications which involve this subject; in the endeavour to do so I must appeal to a wider experience than I have been able to tabulate.

First as to the stomach. I have examined this organ after death with the naked eye and with the microscope in many cases where the tongue has been thickly coated or furred. Examination of the stomach is unsatisfactory partly from the post-mortem influence of its contents; but it may be safely said that this organ presents no changes which are obviously analogous to those of the tongue, and the same statement may be extended to the rest of the alimentary canal.

I have not been able to discern any state of tongue especially connected with dyspepsia or ulcer of the stomach. When dyspepsia is associated with stomatitis the tongue is

sometimes thickly coated, probably as a local result. In simple dyspepsia and ulcer, the lower degrees of coating are usually present, possibly in connection with the loss of appetite and the limitation of food. In one case of ulcer I noted the tongue as clean but flabby.

Next as to the bowels. Some forms of constipation or diseases associated with it are undoubtedly connected with changes in the tongue; but that the arrest is not necessarily connected with any such changes is evident. I have seen the tongue perfectly clean and normal after three weeks of nearly total constipation in a hysterical woman, and equally so after twenty-eight days of nearly total constipation in a woman who was next day made the subject of colotomy for stricture of the sigmoid flexure; and it would not be difficult to cite other cases where the tongue has remained natural under long constipation, either functional or connected with chronic obstruction. On the other hand, where the obstruction is acute, the tongue early becomes stippled or coated and dry. I think the difference between the tongue of acute and of chronic obstruction, and between one case of chronic obstruction and another, is in the presence or absence of constitutional disturbance. The early dryness of acute obstruction is not, as a rule, associated with pyrexia, but depends on salivary deficiency associated with the constitutional state. The dryness determines the state of tongue. Unless there be constitutional disturbance, which with simple constipation or chronic obstruction there often is not, the tongue may remain natural. I have more than once noticed an old block in the rectum to be attended with thick coating, which has disappeared or lessened on the removal of the accumulation. It may be inferred that in such cases there is general disturbance and probably pyrexia connected with morbid absorption, as the fetor of the accumulation cannot fail to suggest.

Passing from constipation to the opposite condition, diarrhœa is early and powerfully productive of lingual changes. The tabulated cases speak for themselves, and I might largely add to the evidence they present. Looking through my notes not included in the tables, I find the tongue of diarrhœa described as 'thickly coated and dry,' 'thickly coated, mouth dry, saliva scanty,' 'foul and coated,' 'brown, dry, and furred,' 'coated with brownish fur,' 'very dry, brown in centre, coated,' 'dry, brown, and cracked.' There is scarcely any condition in which the tongue becomes more rapidly dry, coated, furred, and encrusted than severe diarrhœa. The absence of saliva is self-evident; direct dehydration helps to cause this, and pyrexia, which is often present, helps the desiccation.

I have already referred to the red and bare tongue which is sometimes associated with dysentery, together with abscess of the liver. Here we have fever of the hectic type together with the purging.

### Opium.

It is no part of my design to describe the action of drugs upon the tongue, but I will nevertheless insert a word as to opium. It is well known that opium makes the mouth dry. I have frequently given it experimentally to persons whose tongues have been clean, or nearly so, and moist. The effect has always been to coat the tongue, impair the appetite, and diminish the saliva. In one case the temperature rose from normal to 100°. Some of the coating may be due to the loss of appetite and of friction, but, the diminution of saliva must also have some importance attached to it, and falls in with what has been already said with regard to the relation of this secretion to the coat.

## On the Influence of the Nervous System upon the Tongue.

This is not to be ignored, though I think more has been attributed to it than can be demonstrated. The late Mr. Hilton showed that coating of the tongue was often confined to the side of painful teeth, and referred this to reflex nervous irritation. I have already adverted to such cases in the view that the effect was due to want of wear on the tender side. It is a matter of common observation that in hemiplegia the tongue is not unilaterally affected as if from the local change, but bilaterally as if from the constitutional results of it. On the other hand, I have already cited an instance in which there was reason to believe that unilateral coating and dryness of the tongue depended on an injury to the chorda tympani on the affected side. Here we have the intervention of saliva, and may with probability ascribe the coating to the want of this secretion rather than to the direct effect of the nervous lesion. It has already been shown how largely deficiency of saliva affects the tongue, and it is a matter of ancient as well as modern experience that this secretion is much under the influence of the nervous system. I do not now refer to physiological experiments, but to conditions of wider range. The mind affects the saliva, and may, or even must, by its means, or by means of its absence, affect the tongue. The dryness of agitation is well known; the tongue 'cleaves to the roof of the mouth.' The Eastern ordeal by rice, which can be swallowed by the innocent, not by the guilty, will occur to everyone. I have often noticed the tongue to be white and sodden-looking after an exacerbation of nervousness, associated in particular with phosphatic urine, and thought the first change to be a want of saliva, the coating secondary. I

was told by Mr. Charles Hawkins that a certain practitioner, who saw many men of business after their business hours, could always tell how things were in the City by the tongues of his patients.

### The Tongue in relation to Individual Diseases.

I need not here discuss in relation to the tongue the general conditions of dehydration, pyrexia, and prostration, since to do so would be but to repeat what I have said in connection with coating and dryness. Neither need I delay, or only for a moment, to point out that if one were to seek to connect the states of the tongue as a general rule with individual diseases, so various, and apparently so contradictory, would be the results that nothing but confusion could result. What can be said towards this end may be briefly put. There is a tongue of heart disease of which the cyanotic character is evident to the naked eye, and a somewhat similar condition which is apt to accompany chronic albuminuria, which needs the microscope for its detection. The tongue of diabetes mellitus has a special tendency to dryness, as has been sufficiently explained; but this does not prevent its being sometimes normally moist or even normal in all respects. Among the febrile diseases it would commonly be said that the tongue of scarlatina and that of typhoid are characteristic. The well-known strawberry tongue of scarlatina approaches nearly to the pathognomonic, for the eruption helps to make it so; but even here other febrile disorders, like pneumonia, in which the face and mouth are apt to be injected, produce an excellent counterfeit, besides which the strawberry character in scarlatina is soon replaced by other phases of coating and by denudation. The tongue of typhoid presents many varieties, according to the stage of the disease and other circumstances. In

TABLE SHOWING VARIETIES OF TONGUE AND DISEASE IN 366 PATIENTS.

| | Natural | Stippled, Moist | Stippled, Dry | Stippled + Coated, Moist | Coated, White, Moist | Coated, White, Dry | Strawberry | White, Plastered | Furred, Moist | Furred, Dry | Encrusted, Dry | Becoming bare | Denuded, Red, Dry | Cyanosal | Number of cases of each disease and condition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cerebral hæmorrhage | — | — | — | 1 | 1 | — | — | — | — | — | — | — | — | — | 2 |
| „ embolism | — | — | — | 1 | — | — | — | — | — | 1 | — | — | — | — | 2 |
| „ disease with coma | — | — | — | — | — | — | — | — | — | 2 | — | — | — | — | 2 |
| „ disease with hemiplegia or other paralysis | — | 2 | — | 1 | 2 | 1 | — | — | — | — | — | — | — | — | 6 |
| „ giddiness, insanity, or tumour | — | — | — | 1 | — | — | — | 1 | — | — | — | 1 | — | — | 3 |
| Bulbar paralysis | — | — | — | 1 | — | — | — | — | — | — | — | — | — | — | 1 |
| Sunstroke | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 |
| Acute myelitis | — | — | — | — | — | 1 | — | — | — | — | — | — | — | — | 1 |
| Tetanus | 1 | — | — | — | — | — | — | — | — | — | — | 1 | — | — | 2 |
| Neuralgia | — | 1 | — | — | — | — | — | — | — | — | — | — | — | — | 1 |
| Chorea | 2 | 1 | — | 1 | — | — | — | — | — | 1 | — | — | — | — | 5 |
| Hysteria | — | 2 | — | 2 | — | — | — | — | — | — | — | — | — | — | 4 |
| Valvular disease of the heart | 1 | 7 | — | 5 | — | 2 | — | — | — | 1 | — | 1 | — | 3 | 20 |
| Intrathoracic aneurism | 1 | — | — | — | 1 | — | — | — | — | 3 | — | — | — | — | 5 |
| Pericarditis | — | 1 | — | 1 | — | — | — | — | — | — | 1 | — | — | — | 3 |
| Pneumonia and pleuro-pneumonia | 2 | 4 | — | 2 | 6 | 2 | 2 | 8 | 2 | — | 2 | 4 | 5 | — | 39 |
| Broncho-pneumonia | — | 2 | — | — | — | — | — | — | — | 1 | — | — | 1 | — | 4 |
| Pleurisy with effusion and hydrothorax | 1 | 1 | 1 | — | 2 | — | — | — | — | 1 | — | — | — | — | 6 |
| Empyema and pyo-pneumothorax | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 |
| Laryngitis | — | 1 | — | 1 | 1 | — | — | — | — | — | — | — | — | — | 3 |
| Bronchitis | — | 2 | — | 1 | 2 | — | — | 3 | — | — | — | — | — | 2 | 10 |
| Asthma | — | — | — | 1 | — | — | — | — | — | — | — | — | — | — | 1 |
| Phthisis, including hæmoptysis and tuberculosis | 1 | 1 | — | 3 | 3 | 1 | — | 1 | — | — | 1 | — | 4 | — | 15 |
| Whooping cough | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 |
| Acute obstruction of bowel | — | 1 | 1 | — | 1 | 1 | — | 1 | — | — | — | — | — | — | 5 |
| Chronic „ „ | — | — | — | — | 1 | — | — | — | — | — | — | — | — | — | 1 |
| Fæcal accumulation | — | 1 | — | — | — | — | — | — | — | — | 1 | — | — | — | 2 |
| Constipation, chronic | — | — | — | 2 | — | — | — | — | 1 | — | — | — | — | — | 3 |
| Colic (lead, &c.) | — | — | — | 1 | — | — | — | — | — | — | — | — | — | — | 1 |
| Peritonitis or perityphlitis | — | — | 1 | — | 1 | — | 1 | 1 | 1* | 1 | — | 1* | — | — | 7 |
| Gastric ulcer, simple | — | 1 | — | 1 | 1 | — | — | — | — | — | — | — | — | — | 3 |
| Repletion, surfeit | — | — | — | — | 1 | 1 | — | — | — | — | — | — | 1 | — | 3 |
| Recent alcoholism | — | 2 | — | 1 | — | — | — | — | — | — | 1 | — | — | — | 4 |
| Dyspepsia, or with stomatitis | — | — | — | — | 1 | 2 | — | 1 | — | — | — | — | — | — | 4 |
| Sympathetic vomiting, uterine | — | — | — | — | 1 | — | — | — | — | — | — | — | — | — | 1 |
| Simple or choleraic diarrhœa | — | — | — | 1 | 2 | — | — | — | — | 2 | 1 | — | — | — | 6 |
| Dysentery | — | 1 | — | — | — | — | — | 2 | — | — | — | — | — | — | 3 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Starvation | — | — | — | — | 1 | — | — | — | — | — | — | — | 1 | — | — | 1 |
| Stricture of œsophagus, limiting food | — | — | — | 1 | 2 | — | — | — | — | 1 | — | — | — | — | — | 4 |
| Solids withheld | — | 1 | 2 | 8 | 15 | 3 | 2 | 8 | 1 | 5 | 4 | 2 | 6 | 3 | 60 |
| Limitation of drink for special reasons | 3 | 3 | 1 | 1 | — | — | — | — | — | 3 | — | — | 2 | — | 13 |
| Tonsillitis | — | 1 | — | — | — | 1 | — | — | — | — | — | — | — | — | 2 |
| Nostrils plugged, for epistaxis | — | 1 | — | — | — | — | — | — | — | — | — | — | — | — | 1 |
| Cirrhosis of liver | — | 1 | — | 1 | — | — | — | — | — | 2 | — | 1 | 2 | — | 7 |
| Enlarged liver, nature uncertain | — | — | — | — | — | — | — | 1 | — | 1 | — | — | — | — | 2 |
| Obstructive jaundice, gall-stones, &c. | — | 2 | — | — | — | — | — | — | — | — | 1 | — | 1 | — | 4 |
| Ascites or anasarca, cause uncertain | 1 | — | — | 2 | — | — | — | — | — | — | — | — | — | — | 3 |
| Chronic albuminuria | 2 | 5 | 1 | 6 | 1 | 1 | — | — | — | — | — | — | — | — | 16 |
| Lardaceous disease | — | — | — | — | — | — | — | — | — | — | — | — | 2 | — | 2 |
| Uræmia | — | — | — | — | 2 | — | — | — | 1 | — | 2 | — | — | — | 5 |
| Diabetes mellitus | — | 2 | — | — | — | 2 | — | — | — | — | 1 | — | 5 | — | 10 |
| ,, insipidus | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 |
| Hæmoglobinuria | — | 1 | — | — | — | — | — | — | — | — | — | — | — | — | 1 |
| Chyluria | — | — | — | — | — | — | — | — | — | 1 | — | — | — | — | 1 |
| Acute rheumatism | — | 5 | — | 7 | 1 | 5 | — | 3 | — | 1 | 1 | — | — | — | 23 |
| Subacute, chronic rheumatism, and sciatica | — | 2 | — | 4 | 4 | — | — | — | — | 1 | — | — | — | — | 11 |
| Acute gout | — | 1 | — | — | — | — | — | — | — | — | — | — | — | — | 1 |
| Chronic gout | — | 3 | — | 3 | — | — | — | — | — | — | — | — | — | — | 6 |
| Syphilis, congenital and tertiary | 1 | — | — | 1 | — | — | — | — | — | — | — | — | — | — | 2 |
| Lymphadenoma | — | 1 | — | — | — | — | — | — | — | — | — | — | — | — | 1 |
| Addison's disease | — | — | — | 1 | — | — | — | — | — | — | — | — | — | — | 1 |
| Internal cancer | — | — | — | — | 1 | — | — | — | — | — | 2 | 1 | — | — | 4 |
| Typhus | — | — | — | — | — | — | — | — | — | — | 1 | — | — | — | 1 |
| Typhoid | — | — | — | 3 | 4 | — | 1 | 5 | — | 1 | 1 | 1 | 2 | — | 18 |
| Febricula, febrile attack, uncertain | — | — | — | — | 1 | — | — | 1 | — | 1 | — | — | — | — | 3 |
| Scarlatina | — | — | — | — | — | — | 3 | — | — | — | — | — | — | — | 3 |
| Mumps | — | — | — | — | — | — | — | 1 | — | — | — | — | — | — | 1 |
| Erysipelas | — | — | — | — | 1 | — | — | — | — | — | 1 | — | — | — | 2 |
| Measles | — | — | — | — | — | — | — | 1 | — | — | — | — | — | — | 1 |
| Pyæmia or septicæmia | — | — | — | — | — | — | — | 2 | — | — | 3 | 1 | 1 | — | 7 |
| Ague | — | — | — | 1 | — | — | — | — | — | — | — | — | — | — | 1 |
| Eczema | — | — | — | 2 | — | — | — | — | — | — | — | — | — | — | 2 |
| Pemphigus | — | — | — | 1 | — | — | — | — | — | — | — | — | — | — | 1 |
| Erythema nodosum | — | — | — | 1 | 1 | — | — | — | — | — | — | — | — | — | 2 |
| Myxœdema | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 | 1 |
| Idiopathic anæmia | — | — | — | — | — | — | — | — | — | — | 1 | — | — | — | 1 |
| Rapid emaciation, cause uncertain | — | — | — | — | — | — | — | — | — | — | 1 | — | — | — | 1 |
| Anæmia, chlorotic, &c. | 1 | 4 | — | 4 | — | — | — | — | — | — | — | — | — | — | 9 |
| Pyrexia | 2 | 3 | — | 6 | 9 | 6 | 4 | 15 | 1 | 3 | 8 | 5 | 11 | — | 73 |
| Hyperpyrexia | — | — | — | — | — | — | — | 3 | — | — | 1 | 1 | 2 | — | 7 |
| Exhaustion from suppurative discharge | — | — | — | — | — | — | — | — | — | — | — | — | 4 | — | 4 |
| Suppuration without discharge | — | — | — | 1 | — | — | — | — | — | 1 | — | — | — | — | 2 |
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| Convalescent | 6 | — | — | 2 | 2 | — | — | — | — | 1 | — | — | — | — | 11 |
| Total number of cases | 24 | 62 | 4 | 69 | 48 | 20 | 7 | 32 | 5 | 24 | 22 | 13 | 30 | 6 | 366 |
| Deaths | 2 | 15 | 1 | 7 | 11 | 6 | 0 | 10 | 3 | 9 | 14 | 10 | 16 | 4 | 108 |

* Also perforation.

eighteen cases it was stippled and coated, coated, plastered, strawberry, furred, encrusted, and denuded. Only two presented the dry furred, or encrusted, state which is commonly regarded as typical. The dry bare condition was not absent. The tongue of pyæmia more often shows the ideal typhoid state than does that of typhoid itself. I say nothing of the tongue of typhus, of which of late years I have seen but little. In the only case I have recently seen it was dry and black, as it is known often to be. Lobar pneumonia presents a range of tongue which runs through the whole gamut, the plastered type preponderating, as it does with typhoid and most other acute febrile states. In bronchitis the lower degrees of coating are generally presented; but if the disease be considerably febrile the tongue is apt to be plastered, which may be accepted as a sign of severity. With regard to acute rheumatism, the variety is considerable, the lower degrees of coating being more often seen than with diseases which present a higher temperature and more depression. Nevertheless, the dry furred and encrusted tongues, with their significations, are not absent from the series. It would serve no purpose, and would involve repetition, were I to dwell further upon the relations of the tongue to individual diseases; the tables speak in this sense, though the experience therein recorded is but a fragment small indeed compared to what must be in the minds of many who honour me with their presence to-day. The table now displayed (see pages 106, 107) is a compendium or consolidation of those already adduced separately in connection with each variety of tongue, and presents the cases which have been systematically tabulated. The kinds of tongue which were observed with each disease or state may be learned by reading horizontally; the several disorders and conditions which were recognised with each kind of tongue may be learned by reading vertically.

I have not dealt with local affections of the tongue, nor have I had much experience of them. That local irritation increases the coat may readily be believed. The coated or thickly stippled tongue of the smoker is well known; this may even assume—though, I trust, but rarely—the startling form of leucoplakia—an exaggeration, I presume, of the epithelial growth, though here I speak without post-mortem observation. I present a drawing from a patient with regard to whom I had the advantage of the opinion of Mr. Jonathan Hutchinson. I will dwell no further on this part of the subject, save to repeat what I hope has been made evident, that general influences tell more widely upon the tongue than local ones.

## Conclusions.

It only remains that I should sum up briefly the conclusions which have been arrived at.

The tongue is an index of constitutional states, seldom of individual diseases. An ancient theologian described the face of a wicked man as a map of the empire of sin. It has been fancied that the tongue presents a map of the empire of disease; and a writer, though one of no great note, has gone so far as to divide the lingual surface into a number of rectangular regions as numerous as the United States of America, which he places under the rule of separate organs; the larynx, the bronchi, the lungs, the pleuræ, the large intestine, the small intestine, the kidneys, and the brain each possessing a distinct territory. The heart, says this writer very wisely, has a common control over all. But in truth the tongue has no such local signification; it seldom points to solitary organs or isolated disorders, but is rather a gauge of the effects of disease upon the system than an indication as to the locality of it. It is often a guide in treatment, so far as treatment is general, not local; and it is an important

help in prognosis. It may, indeed, be doubted whether any means of observation open to the physician, including the pulse and the thermometer, give him more insight into constitutional states than he can derive from the tongue. Clinically it always speaks the truth, and in a language which is not foreign to the experienced physician. And how much truth, or rather how many truths, are to be read on how small a page! Conditions of fever and of feeding; states of the nervous system; the maintenance or abeyance of vital secretions; failure of vitality, though we may not be be able to find out why; in one case that the disease is getting the better of the patient; in another that the patient is getting the better of the disease;—all these are discernible to the educated eye. The clinical value of the tongue largely depends on the number of interests it represents; these are more or less mingled in its indications, and the impression they convey is a combined one; but it is none the less valuable because comprehensive; it gives to a glance what otherwise could be learned only by detailed inquiry.

The two factors which stand before all others in the making of the medical indications which the tongue presents, by which I imply those changes which are connected with remote or general states not local disorders, are the heat of the body and the secretion of saliva.

It has been shown that the white coat of the tongue essentially consists of horny epithelium, and that the various grades of coating are mainly due to its increase. I have not dwelt upon the parasites which are apt to gather upon the coat; these are only of secondary interest; they do not determine the character of the coat or of the tongue, and they have been subjected to an exhaustive examination by Mr. Butlin, with results in negation of their practical importance. It has been shown that the several degrees of coat are mainly due to overgrowth of epithelium, though in a smaller

measure to its want of removal, and that there is a remarkable correspondence between the heat of the body and the coating of the tongue. If the tongue be coated, the indication is usually of febrile disturbance without especial reference to the stomach or liver, and points more to the general system than the alimentary. Though something is to be ascribed to disuse, yet I think I have shown that too much has been; and that more than one modern observer, like an uncharitable pedagogue, has attributed to idleness what illness might truthfully explain.

Superadded to the *forcing process*, if I may so speak, of fever, we have step by step other changes, dryness, furring and incrustation, which are essentially connected with want of saliva. I have endeavoured to show that this diminution or arrest is declared by the state of the tongue almost as certainly as by observations on the ducts, and is the chief cause of the furring and incrustation which accompanies it. It is true that in the crust are parasites, but these are secondary; the primary fact is the want of saliva, a clinical indication always of importance, though the process by which it is brought about is not always the same. I have shown the effect of dehydration in diabetes and by diarrhœa, but it has, I think, been made clear that the most frequent and important concomitant of the dryness is a certain failure of bodily force and function which I have not assumed to describe with physiological exactness, but have expressed by such terms as weakness, prostration, and exhaustion. I do not ignore the effects of deprivation of water, of alcohol, and of opium; but, nevertheless, the relation to which I have drawn attention, so far as it concerns such dryness as to cause incrustation, has a general hold. It is difficult not to infer that with the salivary are other glandular failures, more especially such as concern the digestive system. Good digestion waits on appetite. Putting aside diabetes, where

there are special circumstances, it may be said with general truth that with the dry encrusted tongue appetite is *nil*, and solid food impossible, not merely from the local difficulty caused by the dryness of the mouth, but from inability more profoundly seated. It may be inferred without rashness that the loss of power to take food is connected with a loss of power to assimilate it; and if the digestive function is in abeyance it is not likely that the digestive fluids are abundant. Hence it presents itself as what may be called a working probability that a want of the more vital juices concerned in nutrition may be indicated by the want of saliva which is sometimes so conspicuously displayed. Physicians acknowledge in their practice some such guidance; the dry and encrusted tongue is seldom disregarded as a call for animal liquids, which require little digestion, and alcohol, which requires none. To translate theory into practice is not only dangerous because the theory may be wrong, but the means may be ill-adapted though the theory be sound. I have often taken the dry tongue as an indication for peptonised food, and thought it beneficial, but have not as yet had enough experience to speak confidently.

Proceeding from the varieties of clothing which dryness produces, we come to the opposite, but sometimes succeeding, condition—that of nakedness. This is often connected, like the previous, as has been shown, with want of saliva, of which it is usually a later concomitant. It may be simply due to this cause, but other circumstances are so often present that it is difficult not to assign to them some share in the loss of integument, and attribute this, in part at least, to the failure of nutrition which belongs to hectic fever and suppurative waste. When the tongue becomes dry and bare, it is ill with the patient. He is not sure to die, but likely to. If, as has been said, the tongues of dying men enforce attention, it must be often directed to this. The indication

of the red, smooth tongue is for what failing nutrition calls for—tonics, stimulants, and food, probably liquid, but nourishing. The failing pulse does not more surely tell of asthenic tendencies than, as a rule, does the red, dry, and polished tongue.

The tongue, indeed, has a whole book of prognostics written upon its surface. A glance may suffice to show whether it is on the road towards health or from it, and thus tell us at once what could otherwise be ascertained, and then less surely, only by a historical research. When the tongue is approaching the condition of health so, as a rule, is the patient, as is seen whenever the red, dry, and bare tongue acquires moisture and clothing. In fevers the gradual recovery by the tongue of moisture and the exposure of a normal surface at the tip and edges as the coat recedes are favourable indications of the greatest significance. There is no better sign in diabetes than the resumption of the natural moisture by a tongue which has been dry. Something may be judged by the way an encrusted tongue cleans; if gradually and from the edges, well; less so when it scales, especially when the surface exposed is red and dry. One glance at a coated or plastered tongue may give an assurance, which perhaps could not be otherwise obtained, that the disease is on the wane. If the thick coat in the centre steeply shelves towards the sides and front, revealing a normal, moist, not over-injected surface, the tongue is in process of cleaning; the natural friction is overcoming the coating process, and tongue and patient are on the mend. A tongue acquires coat more evenly and generally than it parts with it; we can thus tell whether the coating is on the advance or decline, and apply this rule to the disease.

There remains to me only the pleasant duty of mentioning those to whom I have not yet referred to whom I have been indebted. No one who has worked at the tongue can

fail to have profited by the labours of Mr. Jonathan Hutchinson, to whom, indeed, I have been under special obligation, though as surgeon and physician our points of view have not been the same. I must next record my debt to Mr. Sweeting and Mr. Armstrong, of the Western Fever Hospital, and Dr. Collie, of the Eastern Fever Hospital, for kindly providing me with scarlatinal tongues. Clinically I have to acknowledge the services of a series of excellent clerks—Mr. Brushfield, Mr. Le Cronier, Mr. Sortain, Mr. Ogle, Mr. Drabble, and Mr. Barlow. And I have, finally, to thank the Fellows of the College and all who have formed my audience for the attention they have bestowed upon what I fear must too often have been tedious.

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